2022-2023

तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

केन्द्रीय विद्यालय संगठन, एर्नाकुलम क्षेत्र

KENDRIYA VIDYALAYA SANGATHAN
ERNAKULAM REGION

INFORMATICS PRACTICES (065)

CLASS - XII

Student Support Material

CBSE Curriculum

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KENDRIYA VIDYALAYA SANGATHAN
ERNAKULAM REGION

Informatics Practices(065)

Class XII

STUDENT SUPPORT MATERIAL

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MESSAGE FROM DEPUTY COMMISSIONER

It gives me immense pleasure to publish the study material for Class XII Informatics Practices (065). I am sure that the support material will definitely be of great help to the class XII students of all Kendriya Vidyalayas of our region.

This Students' Support Material has been prepared to improve their academic performance. This is a product of the combined efforts of a team of dedicated and experienced teachers with expertise in their subjects. This material is designed to supplement the NCERT text book.

The Support Material contains all the important aspects required by the students. Care has been taken to include the latest syllabus, summary of all the chapters, Sample question papers, problem solving and case-based questions. It covers all essential components that are required for quick and effective revision of the subject.

I would like to express my sincere gratitude to the in- charge Principal and all the teachers who have persistently striven for the preparation of this study material. Their selfless contribution in making this project successful is commendable.

"An ounce of practice is worth tons of knowledge", students will make use of this material meticulously to reap the best out of this effort.

With Best Wishes.

(R SENTHIL KUMAR)
DEPUTY COMMISSIONER

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"Success is no accident. It is hard work, perseverance, learning, studying, sacrifice and most of all, love of what you are doing or learning to do."

Pelé, Brazilian pro footballer

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UNIT 1

Data Handling Using Pandas

Python module- A python module is a python script file(.py file) containing variables, python classes, functions, statements etc.

Python Library/package- A Python library is a collection of modules that together cater to a specific type of need or application. The advantage of using libraries is that we can directly use functions/methods for performing specific type of application instead of rewriting the code for that particular use. They are used by using the import command as-
import libraryname

at the top of the python code/script file.
Some examples of Python Libraries-

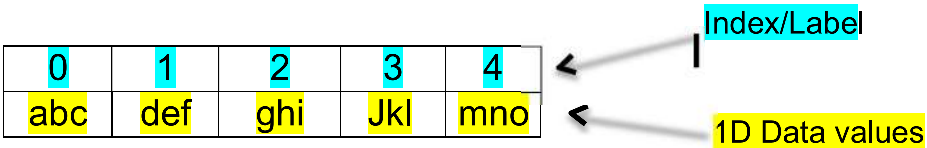
1. **Python standard library**-It is a collection of library which is normally distributed along with Python installation. Some of them are-
    a. **math module**- provides mathematical functions
    b. **random module**- provides functions for generating pseudo-random numbers.
    c. **statistics module**- provides statistical functions
2. **Numpy (Numerical Python) library**- It provides functions for working with large multi-dimensional arrays(ndarrays) and matrices. NumPy provides a large set of mathematical functions that can operate quickly on the entries of the ndarray without the need of loops.
3. **Pandas (PANel + DAta) library**- Pandas is a fast, powerful, flexible and easy to use open source data analysis and manipulation tool. Pandas is built on top of NumPy, relying on ndarrayand its fast andefficient array based mathematical functions.
4. **Matplotlib library-** It provides functions for plotting and drawing graphs.

Data Structure- Data structure is the arrangement of data in such a way that permits efficient access and modification.

Pandas Data Structures- Pandas offers the following data structures-

a) Series - 1D array
b) DataFrame - 2D array

Series- Series is a one-dimensional array with homogeneous data.



0	1	2	3	4
abc	def	ghi	Jkl	mno

Key features of Series-

- A Series has only one dimension, i.e. one axis
- Each element of the Series can be associated with an index/label that can be used to access the datavalue. By default the index starts with 0,1,2,3… but it can be set to any other data type also.
- Series is data mutable i.e. the data values can be changed in-place in memory
- Series is size immutable i.e. once a series object is created in memory with a fixed number of elements, then the number of elements cannot be changed in place. Although the series object canbe assigned a different set of values it will refer to a different location in memory.
- All the elements of the Series are homogenous data i.e. their data type is the same. For example.

0	1	2	3	4
223	367	456	339	927

all data is of int type

a	b	c	de	fg
1	def	10.5	Jkl	True

all data is of object type

Creating a Series- A series object can be created by calling the Series() method in the following ways-

a) **Create an empty Series-** A Series object not containing any elements is an empty Series. It can be created as follows-

```
import pandas as pd
s1=pd.Series() print(s1)

o/p-
Series([], dtype: float64)
```

b) **Create a series from array without index-** A numpy 1D array can be used to create a Series object asshown below. The default index is 0, 1, 2, …

```
import pandas as pd
import numpy as np
a1=np.array(['hello', 'world', 'good', np.NaN])
s1=pd.Series(a1)
print(s1)
```

```
o/p-
0  hello
1  world
2  good
3   nan
dtype: object
```

c) **Create a series from array with index-** The default index for a Series object can be changed and specified by the programmer by using the index parameter and enclosing the index in square brackets. The number of elements of the array must match the number of index specified otherwise python gives an error.

```
#Creating a Series object using numpy array and specifying index
import pandas as pd
import numpy as np
a1=np.array(['hello', 'world', 'good', 'morning'])
s1=pd.Series(a1, index=[101, 111, 121, 131])
print(s1)
```

```
o/p-
101   hello
111   world
121   good
131   morning

dtype: object
```

d) **Create a Series from dictionary-** Each element of the dictionary contains a key:value pair. The key of the dictionary becomes the index of the Series object and the value of the dictionary becomes the data.

```
#4 Creating a Series object from dictionary
import pandas as pd
d={101:'hello', 111:'world', 121:'good', 131:'morning'} s1=pd.Series(d)
print(s1)

o/p-
101      hello
111      world
121      good
131      morning

dtype: object
```

a) **Create a Series from dictionary, reordering the index-** When we are creating a Series object from a dictionary then we can specify which all elements of the dictionary, we want to include in the Series object and in which order by specifying the index argument while calling the Series() method.

- If any key of the dictionary is missing in the index argument, then that element is not added to the Series object.

- If the index argument contains a key not present in the dictionary then a value of NaN isassigned to that particular index.
- The order in which the index arguments are specified determines the order of the elementsin the Series object.

```
#5 Creating a Series object from dictionary reordering
the index
import pandas as pd

d={101:'hello', 111:'world', 121:'good', 131:'morning'}
s1=pd.Series(d, index=[131, 111, 121, 199])
print(s1)

o/p-
131     morning
111     world
121     good
199     NaN

dtype: object
```

Create a Series from a scalar value- A Series object can be created from a single value i.e. a scalarvalue and that scalar value can be repeated many times by specifying the index arguments that many number of times.

```
#6 Creating a Series object from scalar value
import pandas as pd

s1=pd.Series(7, index=[101, 111, 121])print(s1)

o/p-
101         7
111         7
121         7
dtype: int64
```

a) **Create a Series from a List-** A Series object can be created from a list as shown below.

```
#7 Creating a Series object from list

import pandas as pd L=['abc', 'def', 'ghi', 'jkl']s1=pd.Series(L)
print(s1)

o/p-
0             abc
1             def ghi
2             jkl
3

dtype: object
```

b) **Create a Series from a Numpy Array (using various array creation methods) -** A Series object can becreated from a numpy array as shown below. All the methods of numpy array creation can be used to create a Series object.

```
#7a Creating a Series object from list
import pandas as pd
import numpy as np


#a      Create an array consisting of elements of a list [2,4,7,10,
a1=np.array([2,4,7,10, 13.5, 20.4])
s1=pd.Series(a1)
print('s1=', s1)


#b      Create an array consisting of ten
a2=np.zeros(10)
s2=pd.Series(a2, index=range(101,
111)) print('s2=', s2)


#c   Create an array consisting of five
a3=np.ones(5)
s3=pd.Series(a3)
print('s3=', s3)
```

```
#d.Create an array consisting of the elements from
1.1, 1.2, 1.3,1.4, 1.5, 1.6, 1.7
a4=np.arange(1.1,1.8,0.1)
s4=pd.Series(a4)print('s4=', s4)

#e.     Create an array of 10 elements which are linearly spaced between 1 and 10
(both inclusive)
a5=np.linspace(1,10,4)
s5=pd.Series(a5)print('s5=', s5)

#f.     Create an array containing each of the characters of the word 'helloworld'
a6=np.fromiter('helloworld', dtype='U1')
s6=pd.Series(a6)print('s6=', s6)
```

o/p:

```
s1= 0  2.0
1   4.0
2   7.0
3   10.0
4   13.5
5   20.4
dtype: float64
```

```
   s2= 101  0.0
   102    0.0
   103    0.0
   104    0.0
   105    0.0
   106    0.0
   107    0.0
   108    0.0
   109    0.0
   110    0.0
   dtype: float64
   s3= 0 1.0
   1    1.0
   2    1.0
   3    1.0
   4    1.0
   dtype: float64
   s4= 0 1.1
   1    1.2
   2    1.3
   3    1.4
   4    1.5
   5    1.6
   6    1.7
   dtype: float64
   s5= 01.0
1  4.0
2  2   7.0
3  3   10.0
dtype: float64
s6= 0 h
1  e
2  l
3  l
4  o
5  w
6  o
7  r
8  l
9  d
dtype: object
```

Index

SERIES : Operations on Series objects-

1. Accessing elements of a Series object

The elements of a series object can be accessed using different methods as shown below-

a) Using the indexing operator []

The square brackets [] can be used to access a data value stored in a Series object. The index of the element must be entered within the square brackets. If the index is a string then the index must be written in quotes. If the index is a number then the index must be written without the quotes. Attempting to use an index which does not exist leads to error.

```
#8 Accessing elements of Series using index
import pandas as pd

d={101:'hello', 'abc':'world', 121:'good', 131:'morning'}s=pd.Series(d)
print(s['abc'])print(s[131])

o/p- world
   morning
```

a) Using the *loc* property of the Series object

The *loc* property of a Series object can be used to access a range of data values using the label/index name inside [] brackets in the following ways:

1. A single index can be passed to the loc property. This will return back a single value.
2. A list of indexes can be passed. This will return back a Series object containing the multiple values
3. A slice notation using labels/index such as *startindex:stopindex.* Here contrary to the slice notation the ending index value also is included in the result.
4. A boolean array of the same length as the axis being sliced, e.g. [True, False, True].

b) Using the *iloc* property of the Series object

The *iloc* property of a Series object can be used to access a range of data values using the

index position numbers inside [] brackets in the following ways:

5. A single int can be passed to the iloc property. This will return back a single value.
6. A list of int representing index position numbers can be passed. This will return back a Series object containing the multiple values
7. A slice notation using index position numbers can be passed. The data values

at the slice position numbers will the included in the returned Series object

8. A boolean array of the same length as the axis being sliced, e.g. [True, False, True].

2. Accessing the top elements of a Series object

The head() method can be used to return back the top elements of a Series object. This function returns back another Series object. If no parameter is passed to the head() method it returns back the top 5 elements. If an integer parameter (say n) is passed to the head() method, then the top n elements of the Series object is returned back. The index of the respective elements is returned as it was in the original object.

```
#14 Accessing the top elements of a Series object
import pandas as pd

L=[101, 111, 121, 131, 141, 151, 161, 171, 181, 191, 201, 211]
s=pd.Series(L)
```

```
x=s.head()
print('x=\n', x)
y=s.head(3)
print('y=\n', y)

o/p:
x=
0    101
1    111
2    121
3    131
4    141
dtype: int64y=
0    101
1    111
2    121
dtype: int64
```

1. Accessing the bottom elements of a Series object

The tail() method can be used to return back the bottom elements of a Series object. This function returns back another Series object. If no parameter is passed to the tail() method it returns back the bottom 5 elements. If an integer parameter (say n) is passed to the tail() method, then the bottom n elements of the Series object is returned back. The index of the respective elements is returned as it was in the original object.

```
#15 Accessing the bottom elements of a Series object
timport pandas as pd

L=[101, 111, 121, 131, 141, 151, 161, 171, 181, 191, 201, 211]
s=pd.Series(L)
x=s.tail()
```

```
print('x=\n', x)
y=s.tail(3)
print('y=\n', y)
```

o/p: x= 7 171 8 181 9 191 10 201 11 211 dtype: int64	y= 9 191 10 201 11 211 dtype: int64

3. Indexing/Slicing a Series object-

The index [] operator can be used to perform indexing and slicing operations on a Series object. The index[]operator can accept either-

- **a)** Index/labels
- **b)** Integer index positions

a) Using the index operator with labels-

The index operator can be used in the following ways-

i) **Using a single label inside the square brackets-** Using a single label/index inside the square bracketswill return only the corresponding element referred to by that label/index.

```
# 16 indexing a Series object single label
import pandas as pd

d={'a':101, 'b':102, 'c':103, 'd':104, 'e':105, 'f':106}
s=pd.Series(d)
t=s['b']
print(t)

o/p:
102
```

Using multiple labels- We can pass multiple labels in any order that is present in the Series object. The multiple labels must be passed as a list i.e. the multiple labels must be separated by commas and enclosed in double square brackets. Passing a label is passed that is not present in the Series object, should be avoided as it right now gives NaN as the value but in future will be considered as an error byPython.

```
# 17 indexing a Series object
multiple labelsimport pandas as pd

d={'a':101, 'b':102, 'c':103, 'd':104, 'e':105, 'f':106}
s=pd.Serie
s(d)
```

```
u=s[['b', 'a',
'f']]
print(u)

o/p:
b        102
a        101
f        106
dtype: int64
```

ii) **Using slice notation startlabel:endlabel-** Inside the index operator we can pass startlabel:endlabel. Here contrary to the slice concept all the items from startlabel values till the endlabel values including the endlabel values is returned back.

```
# 18 indexing a Series object using startlabel:endlabel
import pandas as pd

d={'a':101, 'b':102, 'c':103, 'd':104, 'e':105, 'f':106}
s=pd.Series(d)
```

```
u=s['b': 'e']
print(u)

o/p:
b   102
c   103
d   104
e   105

dtype: int64
```

b) Slicing a Series object using Integer Index positions-

The concept of slicing a Series object is similar to that of slicing python lists, strings etc. Even though the datatype of the labels can be anything each element of the Series object is associated with two integer numbers:

- In forward indexing method the elements are numbered from 0,1,2,3, … with 0 being assigned to the first element, 1 being assigned to the second element and so on.
- In backward indexing method the elements are numbered from -1,-2, -3, … with -1 being assigned to the last element, -2 being assigned to the second last element and so on.

For example consider the following Series object-

```
d={'a':101, 'b':102, 'c':103, 'd':104, 'e':105, 'f':106}
s=pd.Series(d)
```

The Series object is having the following integer index positions-

forward indexing--->	0	1	2	3	4	5	
	a	b	c	d	e	f	
	101	111	121	131	141	151	
	-6	-5	-4	-3	-2	-1	<-----backward indexing

Slice concept-

The basic concept of slicing using integer index positions are common to Python object such as strings, list, tuples, Series, Dataframe etc. Slice creates a new object using elements of an existing object. It is created as: *ExistingObjectName[start : stop : step]* where start, stop , step are integers

The basic rules of slice:

i. The slice generates index/integers from : start, start + step, start + step + step, and so on. All the numbers generated must be less than the stop value when step is positive.
ii. If step value is missing then by default is taken to be 1
iii. If start value is missing and step is positive then start value is by default taken as 0.
iv. If stop value is missing and step is positive then start value is by default taken to mean till you reach the ending index(including the ending index)
v. A negative step value means the numbers are generated in backwards order i.e. from - start, then start - step, then start -step -step and so on. All the numbers generated in negative step must be greater than the stop value.
vi. If start value is missing and step is negative then start value takes default value -1
vii. If stop value is missing and step is negative then stop value is by default taken to be till you reach the first element(including the 0 index element)

```
#16 Slicing a Series object
import pandas as pd

d={'a':101, 'b':111, 'c':121, 'd':131, 'e':141, 'f':151}
s=pd.Series(d)

x=s[1: :2]
print('x=\n', x)

y=s[-1: :-1]
print('y=\n', y)

z=s[1: -2: 2]
print('z=\n', z)
```

```
o/p:
x=
b   111
d    131
f     151
dtype: int64
y=
f   151
e  141
d   131
c   121
b  111
a  101
dtype: int64
z=
b   111
d  131
dtype: int64
```

QUESTION AND ANSWER SECTION

1

What will be the output of following code-

```
import pandas as pd
s1=pd.Series([1,2,2,7,’Sachin’,77.5])
print(s1.head())
print(s1.head(3))
```

Ans:

```
0        1
1        2
2        2
3        7
4   Sachin
dtype: object

0   1
1   2
2   2
dtype: object
```

2

In pandas, S is a series with the following result:

```
S=pd.Series([5,10,15,20,25])
```

The series object is automatically indexed as 0,1,2,3,4. Write a statement to assign the series as a, b, c, d, e index explicitly.

Ans:

```
S=pd.Series([5,10,15,20,25],index=['a','b','c','d','e'])
```

3

Name any two attributes of Series in Python

Ans. Two attributes of Series in Python are :

1. index
2. values

4

Write the output of the following :

```
import numpy as num
import pandas as pd
arr=num.array([1,7,21])
S1 = pd.Series(arr)
print(S1)
```

Ans.

```
0    1
1    7
2   21
dtype: int32
```

5 Write the output of the following code :

```
import pandas as pd
S1 = pd.Series([31, 28, 31, 30, 31], index = ["Jan", "Feb", "Mar", "Apr", "May"])
print("-----------")
print(S1[1:3])
print("-----------")
print(S1[:5])
print("-----------")
print(S1[3:3])
print("-----------")
print(S1["Jan":"May"])
```

Ans.

```
-----------
Feb    28
Mar    31
dtype: int64
-----------
Jan    31
Feb    28
Mar    31
Apr    30
May    31
dtype: int64
-----------
Series([ ], dtype: int64)
-----------
Jan    31
Feb    28
Mar    31
Apr    30
May    31
dtype: int64
```

6 Differentiate between Pandas Series and NumPy Arrays

Ans. Differences are

Pandas Series	NumPy Arrays
In series we can define our own labeled index to access elements of an array.	In NumPy Arrays we can not define our own labelled index to access elements of an array
Series require more memory	NumPy occupies lesser memory.
The elements can be indexed in descending order also.	The indexing starts with zero for the firstelement and the index is fixed

7 1. What do you mean by Pandas in Python?

Ans. PANDAS (PANel DAta) is a high-level data manipulation tool used for analyzing data. Pandas library has a very rich set of functions.

1. Series
2. DataFrame
3. Panel

8 Name three data structures available in Pandas.

Ans. Three data structures available in Pandas are :

1. Series
2. DataFrame
3. Panel

9 Write the code in python to create an empty Series.

Ans.

```
import pandas as pd
S1 = pd.Series( )
print(S1)
```

OR

```
import pandas as pd
S1 = pd.Series( None)
print(S1)
```

```
OUTPUT : Series([ ], dtype: float64)
```

10 Define data structure in Python.

Ans. A data structure is a collection of data values and operations that can be applied to that data.

11 What do you mean by Series in Python?

Ans. A Series is a one-dimensional array containing a sequence of values of any data type (int, float, list, string, etc) which by default have numeric data labels (called index) starting from zero. Example of a series containing names of students is given below:

Index Value
0 Arnab
1 Samridhi
2 Ramit
3 Divyam
4 Kritika

12 Write command to install pandas in python.

Ans. pip install pandas

13 Write the output of the following :

```
import pandas as pd
S1 = pd.Series(range(100, 150, 10), index=[x for x in "My name is Amit Gandhi".split()])
print(S1)
```

Ans.

```
My        100
name      110
is         120
Amit      130
Gandhi    140
dtype: int64
```

14 Write the output of the following :

```
import pandas as pd
L1=[1,"A",21]
S1 = pd.Series(data=2*L1)
print(S1)
```

Ans.

```
0     1
1     A
2    21
3     1
4     A
5    21
dtype: object
```

15 Which property of series return all the index value?

Ans. index property return all the index value

16 Write the output of the following :

```
import pandas as pd
S1 = pd.Series(range(1,15,3), index=[x for x in "super"])
print(S1)
```

Ans.

```
s     1
u     4
p     7
e    10
r    13
dtype: int64
```

17 Complete the code to get the required output :

```
import _______ as pd
_________ = pd.Series([31, 28, 31], index = ["Jan", "Feb", "Mar"] )
print(S1["________"])
```

OUTPUT :

```
28
```

Ans.

```
import pandas as pd
S1 = pd.Series([31,28,31], index = ["Jan","Feb","Mar"])
print(S1["Feb"])
```

18 Fill in the blank of given code, if the output is 71.

```
import pandas as pd
S1 = pd.Series([10, 20, 30, 40, 71,50])
print(S1[ ___________ ])
```

Ans.

```
import pandas as pd
S1 = pd.Series([10, 20, 30, 40, 71,50])
print(S1[ 4 ])
```

19 Write a program to modify the value 5000 to 7000 in the following Series “S1”

```
A    25000
B    12000
C     8000
D     5000
```

Ans.

```
import pandas as pd
S1[3]=7000
print(S1)
```

20 Write a program to display only those values greater than 200 in the given Series “S1”

```
0     300
1     100
2    1200
3    1700
```

Ans.

```
import pandas as pd
S1 = pd.Series([300, 100, 1200, 1700])
print(S1[S1>200])
```

Index

DATA FRAMES

❖ DataFrame Data Structure

- It is **two dimensional (tabular) heterogeneous data labeled array.**
- It has two indices or two axes : **a row index (axis=0)** and a **column index (axis=1)**
- The **row index is known as index** and **the column index is** called the **column name.**
- The indices can be of any data type.
- It is both **value mutable** and **size mutable.**
- We can perform arithmetic operations on rows and columns.

❖ Creating and Displaying a DataFrame

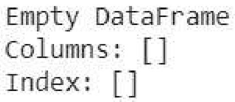
To create a DataFrame object, we can use the syntax:

<dataframe object> = pandas.DataFrame(<a 2D datastructure> , [columns=<column sequence>] , [index=<index sequence>])

where the 2D data structure passed to it, contains the data values.

- **Empty DataFrame**

```
import pandas as pd
df=pd.DataFrame()
print(df)
```



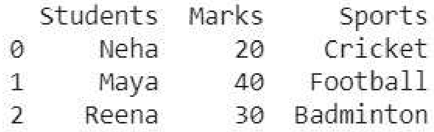
```
Empty DataFrame
Columns: []
Index: []
```

- **DataFrame from 2D dictionary**

A 2D dictionary is a dictionary having items as (key : value) where value part is a data structure of any type : a list, a series, a dictionary etc. But the value parts of all the keys should have similar structure and equal lengths.

✓ **Creating a DataFrame from 2D dictionary having values as lists:**

```
dict1={'Students':['Neha','Maya','Reena'],
'Marks':[20,40,30],
'Sports':['Cricket', 'Football','Badminton']}
df1=pd.DataFrame(dict1)
print(df1)
```



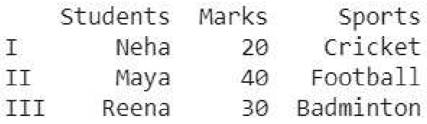
```
  Students  Marks     Sports
0     Neha     20    Cricket
1     Maya     40   Football
2    Reena     30  Badminton
```

- The keys of the dictionary has become columns.
- The columns are placed in sorted order.
- The index is assigned automatically (0 onwards).

We can specify our own index too by using the index argument.

```
df2=pd.DataFrame(dict1,index=['I','II','III'])
print(df2)
```

- The number of indexes given in the index sequence must match the length of the dictionary’s values, otherwise Python will give error.

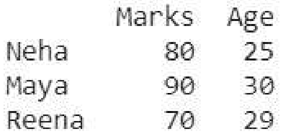


```
    Students  Marks     Sports
I       Neha     20    Cricket
II      Maya     40   Football
III    Reena     30  Badminton
```

✓ **Creating a DataFrame from 2D dictionary having values as Series objects.**

- DataFrames are two dimensional representation of series.

```
smarks=pd.Series({'Neha':80,'Maya':90,'Reena':70})
sage=pd.Series({'Neha':25,'Maya':30,'Reena':29})
dict={'Marks':smarks,'Age':sage}
df3=pd.DataFrame(dict)
```

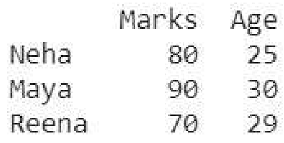


```
       Marks  Age
Neha      80   25
Maya      90   30
Reena     70   29
```

```
print(df3)
```

or

```
smarks=pd.Series([80,90,70],index=['Neha','Maya','Reena'])
sage=pd.Series([25,30,29],index=['Neha','Maya','Reena'])
dict={'Marks':smarks,'Age':sage}
df3=pd.DataFrame(dict)
print(df3)
```

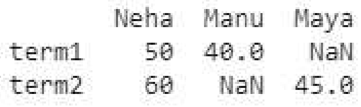


```
       Marks  Age
Neha      80   25
Maya      90   30
Reena     70   29
```

- DataFrame object created has **columns assigned** from the **keys of the dictionary object** and its **index assigned** from the **indexes of the Series object** which are the values of the dictionary object.

- **Creating a DataFrame from list of dictionaries**

```
student=[{'Neha':50,'Manu':40},{'Neha':60,'Maya':45}]
df4=pd.DataFrame(student,index=['term1','term2'])
print(df4)
```

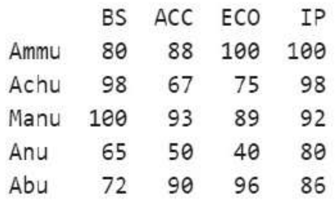


```
       Neha  Manu  Maya
term1    50  40.0   NaN
term2    60   NaN  45.0
```

- NaN is automatically added in missing places.

❖ Selecting or Accessing Data

```
import pandas as pd
dict={'BS':[80,98,100,65,72],'ACC':[88,67,93,50,90],
   'ECO':[100,75,89,40,96],'IP':[100,98,92,80,86]}
df5=pd.DataFrame(dict,index=['Ammu','Achu','Manu','Anu','Abu'])
print(df5)
```



```
       BS  ACC  ECO   IP
Ammu   80   88  100  100
Achu   98   67   75   98
Manu  100   93   89   92
Anu    65   50   40   80
Abu    72   90   96   86
```

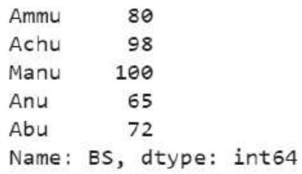
- **Selecting / Accessing a column**

Syntax :

<dataframe object>[<column name>] Or <dataframe object>.<column name>

- In the dot notation make sure not to put any quotation marks around the column name.

```
print(df5.BS)
or
print(df5['BS'])
```



```
Ammu     80
Achu     98
Manu    100
Anu      65
Abu      72
Name: BS, dtype: int64
```

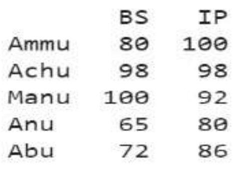
- **Selecting / Accessing multiple columns**

Syntax :

<dataframe object>[[<column name>,<column name>,…….]]

- Columns appear in the order of column names given in the list inside square brackets.

```
print(df5[['BS','IP']])
```

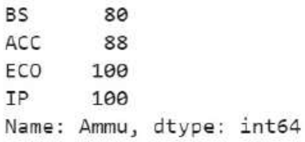


```
       BS   IP
Ammu   80  100
Achu   98   98
Manu  100   92
Anu    65   80
Abu    72   86
```

- **Selecting / Accessing a subset from a DataFrame using Row/Column names**
  <dataframe object>.loc[<start row>:<end row>,<start column>:<end column>]
  - **To access a row:**
    <dataframe object>.loc[<row label>, :]

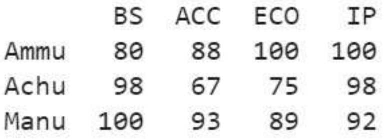
- Make sure not to miss the colon after comma.

print(df5.loc['Ammu', :])



```
BS      80
ACC     88
ECO    100
IP     100
Name: Ammu, dtype: int64
```

- **To access multiple rows:**
  <dataframe object>.loc[<start row>:<end row> , :]
  - Python will return all rows falling between start row and end row; along with start row and end row.
    print(df5.loc['Ammu':'Manu', :])

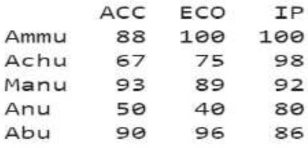


```
       BS  ACC  ECO   IP
Ammu   80   88  100  100
Achu   98   67   75   98
Manu  100   93   89   92
```

  - Make sure not to miss the colon after comma.

- **To access selective columns:**
  <dataframe object>.loc[: , <start column> : <end column>]
  - Lists all columns falling between start and end column.

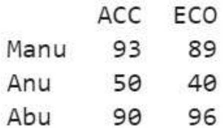
    print(df5.loc[:,'ACC':'IP'])



```
      ACC  ECO   IP
Ammu   88  100  100
Achu   67   75   98
Manu   93   89   92
Anu    50   40   80
Abu    90   96   86
```

  - Make sure not to miss the colon before comma.

- **To access range of columns from a range of rows:**
  <dataframe object>.loc[<start row> : <end row>, <start column> : <end column>]
  print(df5.loc['Manu':'Abu','ACC':'ECO'])



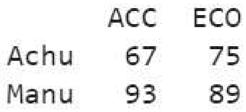
```
      ACC  ECO
Manu   93   89
Anu    50   40
Abu    90   96
```

- **Selecting / Accessing a subset from a DataFrame using Row/Column numeric index/position**

Sometimes our dataframe object does not contain row or column labels or even we may not remember, then to extract subset from dataframe we can use iloc.

<dataframe object>.iloc[<start row index> : <end row index>, [<start column index> : <end column index>]

- When we use iloc, then end index is excluded.
  print(df5.iloc[1:3,1:3])



```
      ACC  ECO
Achu   67   75
Manu   93   89
```

- **Selecting / Accessing individual value**

(i) Either give name of row or numeric index in square bracket of column name

<dataframe object>.<column>[<row name or row numeric index>]

print(df5.ACC['Achu'])   67

or

print(df5.ACC[1])

(ii) Using at or iat

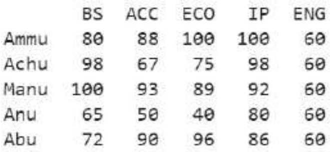
<dataframe object>.at[<row label>,<column label>]
Or
<dataframeobject>.iat[<numeric row index>,
<numeric column index>]
print(df5.at['Achu','ACC'])   67
or
print(df5.iat[1,1])

❖ Assigning / Modifying Data Values in DataFrame

➢ To change or add a column

<dataframe object>[<column name>]=<new value>

- If the given column name does not exist in dataframe then a new column with the name is added.
  df5['ENG']=60
  print(df5)



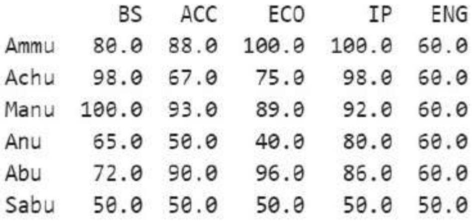
```
      BS  ACC  ECO   IP  ENG
Ammu  80   88  100  100   60
Achu  98   67   75   98   60
Manu 100   93   89   92   60
Anu   65   50   40   80   60
Abu   72   90   96   86   60
```

- If you want to add a column that has different values for all its rows, then we can assign the data values for each row of the column in the form of a list.
  df5[‘ENG’]=[50,60,40,30,70]
- There are some other ways for adding a column to a database.
  <dataframe object>.at[: , <column name>]=value
  Or
  <dataframe object>.loc[: ,<column name>]=value
  df5.at[: ,'ENG']=60
  print(df5)
  or
  df5.loc[: ,'ENG']=60
  print(df5)

➢ To change or add a row

<dataframe object>.at[rowname , :]=value
or
<dataframe object>.loc[rowname , :]=value

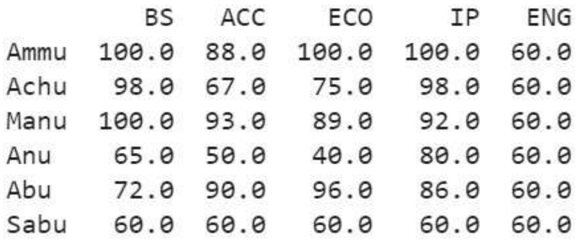
df5.at['Sabu', :]=50
print(df5)
or
df5.loc['Sabu', :]=50
print(df5)



```
        BS   ACC    ECO     IP   ENG
Ammu  80.0  88.0  100.0  100.0  60.0
Achu  98.0  67.0   75.0   98.0  60.0
Manu 100.0  93.0   89.0   92.0  60.0
Anu   65.0  50.0   40.0   80.0  60.0
Abu   72.0  90.0   96.0   86.0  60.0
Sabu  50.0  50.0   50.0   50.0  50.0
```

- If there is no row with such row label, then adds new row with this row label and assigns given values to all its columns.

- **To change or modify a single data value**
  <dataframe object>.<column>[<row label or row index>] = value
  df5.BS['Ammu']=100
  print(df5)
  or
  df5.BS[0]=100
  print(df5)



```
        BS   ACC    ECO     IP   ENG
Ammu  100.0  88.0  100.0  100.0  60.0
Achu   98.0  67.0   75.0   98.0  60.0
Manu  100.0  93.0   89.0   92.0  60.0
Anu    65.0  50.0   40.0   80.0  60.0
Abu    72.0  90.0   96.0   86.0  60.0
Sabu   60.0  60.0   60.0   60.0  60.0
```

❖ Deleting columns in DataFrame

- We can use **del** statement, to delete a column
  del <dataframeobject>[<column name>]
  e.g.: del df5['ENG']
- We can use **drop()** also to delete a column. **By default axis=0.**
  <dataframe object> = <dataframeobject>.drop([<columnname or index>],axis=1)
  Or
  <dataframe object> = <dataframeobject>.drop(columns=[<columnnames or indices>])
  df5=df5.drop(['ECO'], axis =1)
  df5=df5.drop(columns=['ECO','IP'])
- We can use **pop()** to delete a column. The deleted column will be returned as Series object.
  bstud=df5.pop('BS')
  print(bstud)

❖ Deleting rows in DataFrame

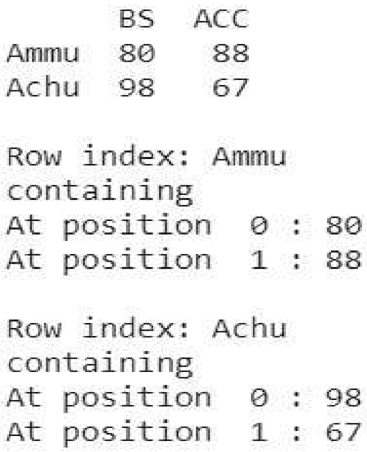
<dataframe object>=<dataframe object>.drop([index or sequence of index], axis=0)
df5=df5.drop(['Ammu','Achu'])
or
df5=df5.drop(index=['Ammu','Achu'])

Iterating over a DataFrame

- **Using pandas.iterrows() Function**
  - The method <DF>.**iterrows**() views a dataframe in the form of **horizontal** subset ie **row-wise.**
  - Each horizontal subset is in the form of (**row-index, Series**) where **Series contains all column values for that row –index.**
  - We can iterate over a Series object just as we iterate over other sequences.

import pandas as pd
dict={'BS':[80,98],'ACC':[88,67]}
df5=pd.DataFrame(dict,index=['Ammu','Achu'])
print(df5,"\n")

for (row,rowseries) in df5.iterrows():

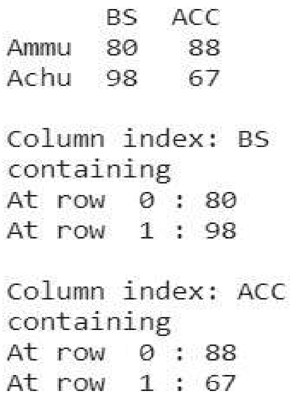


```
      BS  ACC
Ammu  80   88
Achu  98   67

Row index: Ammu
containing
At position  0 : 80
At position  1 : 88

Row index: Achu
containing
At position  0 : 98
At position  1 : 67
```

```
    print("Row index:",row)
    print("containing")
    i=0
    for val in rowseries:
        print("At position ",i,":",val)
        i=i+1
    print()
```

- **Using pandas.iteritems() Function**
  - The method <DF>.**iteritem**() views a dataframe in the form of **vertical** subset ie **column-wise**.
  - Each vertical subset is in the form of (**col-index, Series**) where **Series contains all row values for that column index**.

```
import pandas as pd
dict={'BS':[80,98],'ACC':[88,67]}
df5=pd.DataFrame(dict,index=['Ammu','Achu'])
print(df5,"\n")

for (column,columnseries) in df5.iteritems():
    print("Column index:",column)
    print("containing")
    i=0
    for val in columnseries:
        print("At row ",i,":",val)
        i=i+1
    print()
```



```
      BS  ACC
Ammu  80   88
Achu  98   67

Column index: BS
containing
At row  0 : 80
At row  1 : 98

Column index: ACC
containing
At row  0 : 88
At row  1 : 67
```

❖ Head and Tail Functions

- **head()**

<DF>.head([n=5])

- To retrieve 5, top rows of a dataframe.
- We can change the number of rows by specifying value for n.

```
df5.head(5)
df5.head(2)
```

- **tail()**
  - To retrieve 5, bottom rows of a dataframe.
  - We can change the number of rows by specifying value for n.

```
df5.tail(5)
df5.tail(2)
```

❖ Renaming index / column labels

- **rename()** renames the existing index or column labels in a dataframe/series.
- The old and new index/column labels are to be provided **in the form of a dictionary where keys are the old indexes/row labels and the values are the new names for the same.**

  Syntax:

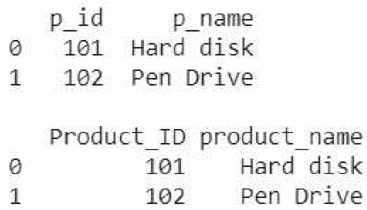
  <DF>.rename(index=None, columns=None, inplace=False)

  where index and columns are dictionary like.

  inplace, a boolean by default False (which returns a new dataframe with renamed index/labels).

  If True then changes are made in the current dataframe.

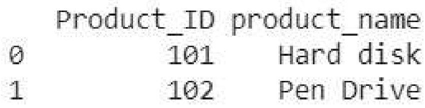
```
import pandas as pd
dict={'p_id':[101,102],'p_name':['Hard disk','Pen Drive']}
df=pd.DataFrame(dict)
print(df,"\n")
#df.rename(columns={'p_id':'Product_ID','p_name':'product_name'},inplace=True)
#or
df=df.rename(columns={'p_id':'Product_ID','p_name':'product_name'})
print(df)
```



```
   p_id     p_name
0   101  Hard disk
1   102  Pen Drive

   Product_ID product_name
0         101    Hard disk
1         102    Pen Drive
```

- Columns can also be renamed by using the **columns attribute** of dataframe.

```
import pandas as pd
dict={'p_id':[101,102],'p_name':['Hard disk','Pen Drive']}
df=pd.DataFrame(dict)
df.columns=['Product_ID','product_name']
print(df,"\n")
```



```
   Product_ID product_name
0         101    Hard disk
1         102    Pen Drive
```

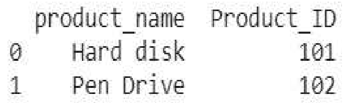
Reindexing

- **reindex()** used **to change the order** of the rows or columns in DataFrame/Series and **returns DataFrame/Series after changes.**

Syntax:

<DF>.reindex(index=None, columns=None, fill_value=NaN)

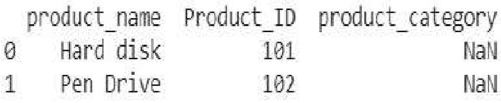
```
df=df.reindex(columns=['product_name','Product_ID'])
print(df)
```



```
  product_name  Product_ID
0    Hard disk         101
1    Pen Drive         102
```

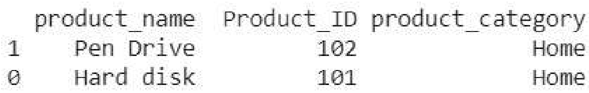
- **If the mentioned indexes/columns do not exist in dataframe, these will be added as per the mentioned order with NaN values.**

```
df=df.reindex(columns=['product_name','Product_ID','product_category'])
print(df)
```



```
  product_name  Product_ID  product_category
0    Hard disk         101               NaN
1    Pen Drive         102               NaN
```

- By using **fill_value**, we can specify which will be filled in the newly added row/column.

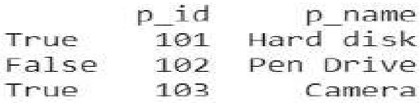


```
  product_name  Product_ID product_category
1    Pen Drive         102             Home
0    Hard disk         101             Home
```

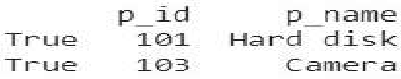
```
df=df.reindex(columns=['product_name','Product_ID','product_category'],
        index=[1,0],fill_value='Home')
print(df)
```

❖ Boolean indexing

- Like default indexing (0,1,2…) or labeled indexing , there is one more way to index – Boolean Indexing (Setting row index to True/ False etc.) .
- This helps in displaying the rows of Data Frame, according to True or False as specified in the command.



```
       p_id     p_name
True    101  Hard disk
False   102  Pen Drive
True    103     Camera
```



```
      p_id     p_name
True   101  Hard disk
True   103     Camera
```

```
import pandas as pd
dict={'p_id':[101,102,103],'p_name':['Hard disk','Pen Drive','Camera']}
df=pd.DataFrame(dict)
df.index=[True,False,True]
print(df,"\n")
print(df.loc[True])
```

❖ DataFrame attributes

All information related to a DataFrame object is available through attributes.

<DataFrane object> . <attribute name>

Attribute	Description
index	Returns the index (row labels) of the DataFrame
columns	Returns the column labels of the DataFrame
axes	Returns a list representing both the axes of the Data Frame (axis=0 i.e. index and axis=1 i.e. columns)
values	Returns a Numpy representation of the DataFrame
dtypes	Returns the dtypes of data in the DataFrame
shape	Returns tuple of the shape of the DataFrame
ndim	Returns number of dimensions of the dataframe
size	Returns the number of elements in the dataframe
empty	Returns True if the DataFrame object is empty, otherwise False
T	Transpose index and columns of DataFrame

Case study questions:

1. Consider the following Data Frame df and answer questions

	A	B	C
DEPT	CS	PROD	MEDICAL
EMPNO	101	102	103
ENAME	ABC	PQR	LMN
SALARY	200000	100000	20000

i. Write code to delete column B
ii. Write the output of the below code
`print(df.tail(2))`
iii. Write code to delete row salary
iv. Change the value of column A to 100
v. Change the value of DEPT of B to MECH
vi. Display DEPT and SALARY of column A and B
vii. Write code to rename column ‘A’ to ‘D’ which will not effect original dataframe
viii. Write code to add a column E with values [CS, 104,XYZ, 300000]
ix. Write code to add a row COMM with values [3000,4000,5000]
x. Write code to rename DEPT to DEPARTMENT which will effect the original dataframe
xi. Write code to display DEPT in A
    i. print(df.A[‘DEPT’])
    ii. print(df[‘A’,’DEPT’])
    iii. print(df.iloc[1:2,1:2])
    iv. print(df.iat[3,2])

xii. Write the output of the statement print(len(df))
    i. 3
    ii. 4
    iii. (4,3)
    iv. (3,4)

Answers :=

i. del df['A']
ii.
```
             A       B      C
ENAME      ABC     PQR   LMN
SALARY  200000  100000  20000
```
iii. df=df.drop(['SALARY'],axis=0)
iv. df['A']=100
v. df.B['DEPT']='MECH'
vi. print(df.loc[['DEPT','SALARY'],["A","B"]])
vii. df.rename(columns={"A":"D"},inplace=False)
viii. df['E']=["CS",104,"XYZ",300000]
ix. df.loc['COMM']=[3000,4000,5000]
x. df.rename(index={"DEPT":"DEPARTMENT"},inplace=True)
xi. print(df.A[‘DEPT’])
xii. 4

2. Consider the following Data Frame df and answer questions

	ACC	BST	ECO	IP
S1	90	91	92	93
S2	94	95	96	97
S3	98	99	100	100
S4	91	92	93	94

i. Create a new column total TOT by adding marks
ii. Find the highest marks scored by student s1
iii. Find the lowest marks scored by student s1
iv. Find the highest marks in ACC
v. Find the lowest marks in IP

Answers:=

i. df['TOT']=df['ACC']+df['BST']+df['ECO']+df['IP']
ii. print(max(df.loc['S1',:]))
iii. print(min(df.loc['S1',:]))
iv. print(max(df['ACC']))
v. print(min(df['IP']))

3. Consider the following Data Frame df and answer questions

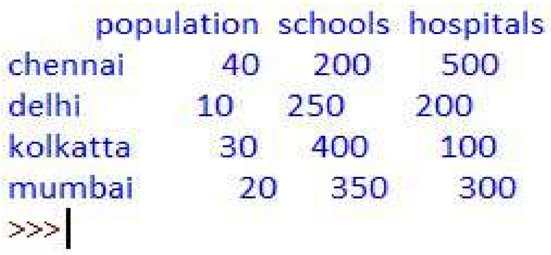
	delhi	mumbai	kolkatta	chennai
hospitals	200	300	100	50
population	10	20	30	40
schools	250	350	400	200

i. Display details of city delhi and chennai
ii. Display hospitals in delhi
iii. Display shape of dataframe
iv. Change the population in kolkatta as 50
v. Rename the column population as “pop”

Answers:=

i. print(df[['delhi','chennai']])
ii. print(df.delhi['hospitals'])
iii. print(df.shape)
iv. df.kolkatta['population']=50
v. df.rename(index={"population":"pop"},inplace=True)

4. Consider the following Data Frame df and answer questions



```
          population  schools  hospitals
chennai          40      200        500
delhi            10      250        200
kolkatta         30      400        100
mumbai           20      350        300
>>>
```

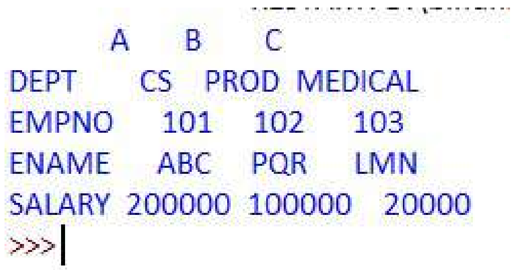
i. Display the name of city whose population >=20 range of 12 to 20
ii. Write command to set all vales of df as 0
iii. Display the df with rows in the reverse order
iv. Display the df with only columns in the reverse order
v. Display the df with rows & columns in the reverse order

Answers:-

i. print(df[df.population>=20])

ii. df[:]=0
iii. print(df.iloc[::-1)
iv. print(df.iloc[:,::-1])
v. print(df.iloc[::-1,::-1])

5. Consider the following Data Frame df and answer questions



```
          A      B      C
DEPT      CS   PROD  MEDICAL
EMPNO     101    102     103
ENAME     ABC    PQR     LMN
SALARY 200000 100000   20000
>>>
```

Write the ouput of the following

i. print(len(df))
ii. print(df.count())
iii. print(df.count(1))
iv. print(min(df.loc['SALARY']))
v. print(max(df.loc['ENAME']))

Answers

i.
```
4
```
ii.
```
A    4
B    4
C    4
dtype: int64
```
iii.
```
DEPT      3
EMPNO     3
ENAME     3
SALARY    3
dtype: int64
```
iv.
```
20000
```
v.
```
PQR
```

QUESTIONS ON DATAFRAME

1. What are the purpose of following statements-

1.df.columns
2. df.iloc[: , :-5]
3. df[2:8]
4. df[:]
5. df.iloc[: -4 , :]

Ans:

1. It displays the names of columns of the Dataframe.
2. It will display all columns except the last 5 columns.
3. It displays all columns with row index 2 to 7.
4. It will display entire dataframe with all rows and columns.
5. It will display all rows except the last 4 four rows

2. What will be the output of df.iloc[3:7,3:6]?

Ans:

It will display the rows with index 3 to 6 and columns with index 3 to 5 in a dataframe ‘df’.

3. Write a python program to create a data frame with headings (CS and IP) from the list given below-

[[79,92][86,96],[85,91],[80,99]]

Ans:

```
l=[[10,20],[20,30],[30,40]]
df=pd.DataFrame(l,columns=['CS','IP'])
print(df)
```

4. Write python statement to delete the 3rd and 5th rows from dataframe df.

```
df1=df.drop(index=[2,4],axis=0)
        or
 df1=df.drop([2,4])
```

Sl No	**MCQ QUESTIONS**
1	To display the 3rd, 4th and 5th columns from the 6th to 9th rows of a dataframe you can write (a) DF.loc[6:9, 3:5] (b) DF.loc[6:10, 3:6] (c) DF.iloc[6:10, 3:6] (d) DF.iloc[6:9, 3:5] **ANS: c) DF.iloc[6:10, 3:6]**
2	We can add a new row to a DataFrame using the _____________ method (i) rloc[ ] (ii) loc[ ] (iii)iloc[ ] (iv)None of the above **ANS: (ii) loc[ ]**
3	The head() function of dataframe will display how may rows from top if no parameter is passed. (i) 1 (ii) 3 (iii) 5 (iv) None of these **ANS : (iii) 5**
4	To change the 5th column's value at 3rd row as 35 in dataframe DF, you can write (a) DF[4, 6] = 35 (b) DF.iat[4, 6] = 35 (c) DF[3, 5] = 35

	(d) DF.iat[3, 5] = 35 **ANS:- d) DF.iat[3, 5] = 35**
5	Which function is used to find values from a DataFrame D using the index number? a) D.loc b) D.iloc c) D.index d) None of these **ANS: b) D.iloc**
6	In a DataFrame, Axis= 0 represents the elements a.rows b.columns c.both d.None of these. **ANS: a.rows**
7	In DataFrame, by default new column added as the ______________ column (i) First (Left Side) (ii) Second (iii)Last (Right Side) (iv) Any where in dataframe **ANS: (iii)Last (Right Side)**
8	Which of the following is correct Features of DataFrame? a. Potentially columns are of different types b. Can Perform Arithmetic operations on rows and columns c. Labeled axes (rows and columns) d. All of the above **ANS: d. All of the above**
9	Write the code to append df2 with df1 a.Df2=Df2.append(Df1) b. Df2=Df2+Df1 c. Df2=Df2.appendwith.Df1 d. Df2=Df1.append(Df1) **ANS: a.Df2=Df2.append(Df1)**
10	When we create DataFrame from List of Dictionaries, then number of columns in DataFrame isequal to the _______ a. maximum number of keys in first dictionary of the list b. maximum number of different keys in all dictionaries of the list c. maximum number of dictionaries in the list

	d. None of the above **ANS: b. maximum number of different keys in all dictionaries of the list**
11	When we create DataFrame from List of Dictionaries, then dictionary keys will become ______ (i) Column labels (ii) Row labels (iii) Both of the above (iv) None of the above **ANS: (i) Column labels**
12	Which method is used to access vertical subset of a dataframe? (i) iterrows() (ii) iteritems() (iii) itercolumns() (iv) itercols() **ANS: (ii) iteritems()**
13	Write statement to transpose dataframe DF. (i) DF.t (ii) DF.transpose (iii)DF.T (iv)DF.T( ) **ANS: (iii)DF.T**
14	In DataFrame, by default new column added as the _____________ column a. First (Left Side) b. Second c. Last (Right Side) d. Any where in dataframe **ANS: Last (Right Side)**
15	We can add a new row to a DataFrame using the _____________ method (i) rloc[ ] (ii) loc[ ] (iii) iloc[ ] (iv) None of the above **ANS: (ii) loc[ ]**
16	Which of the following function is used to load the data from the CSV file to DataFrame? (i) read.csv( ) (ii) readcsv( ) (iii) read_csv( ) (iv) Read_csv( )

	ANS: (iii) read_csv( )
17	*Which of the following function is not a Boolean reduction function* *(i) Empty* *(ii) Any()* *(iii) All()* *(iv) Fillna()* ***ANS: (iv) Fillna()***
18	Which among the following options can be used to create a DataFrame in Pandas ? (a) A scalar value (b) An ndarray (c) A python dict (d) All of these **ANS:- (d) All of these**
19	Which attribute of a dataframe is used to convert row into columns and columns into rows in a dataframe? a) T b) ndim c) empty d) shape **ANS: a) T**
20	When we create DataFrame from List of Dictionaries, then number of columns in DataFrame is equal to the _______ (i) maximum number of keys in first dictionary of the list (ii) maximum number of different keys in all dictionaries of the list (iii) maximum number of dictionaries in the list (iv) None of the above **ANS: (ii) maximum number of different keys in all dictionaries of the list**
21	Which of the following is/are characteristics of DataFrame? a) Columns are of different types b) Can Perform Arithmetic operations c) Axes are labeled (rows and columns) d) All of the above **ANS: d) All of the above**
22	Write short code to show the information having city="Delhi" from dataframe SHOP. (a) print(SHOP[City=='Delhi']) (b) print(SHOP[SHOP.City=='Delhi']) (c) print(SHOP[SHOP.'City'=='Delhi']) (d) print(SHOP[SHOP[City]=='Delhi'])

	ANS: (b) print(SHOP[SHOP.City==’Delhi’])
23	Which of the following commands is used to install pandas? (i)pip install python –pandas (ii)pip install pandas (iii)python install python (iv)python install pandas **ANS: (ii) pip install pandas**
24	Which attribute of a dataframe is used to get number of axis? a.T b.Ndim c.Empty d.Shape **ANS: b.Ndim**
25	Display first row of dataframe ‘DF’ (i) print(DF.head(1)) (ii) print(DF[0 : 1]) (iii)print(DF.iloc[0 : 1]) (iv)All of the above **ANS: (iv)All of the above**
26	To delete a column from a DataFrame, you may use statement. (a) remove (b) del (c) drop (d) cancel statement. **ANS:- (b) del**
27	In given code dataframe ‘Df1’ has ________ rows and _______ columns import pandas as pd dict= [{‘a’:10, ‘b’:20}, {‘a’:5, ‘b’:10, ‘c’:20},{‘a’:7, ‘d’:10, ‘e’:20}] Df1 = pd.DataFrame(dict) (i) 3, 3 (ii) 3, 4 (iii)3, 5 (iv)None of the above **ANS: (iii)3, 5**
28	To delete a row from a DataFrame, you may use (a) remove (b) del (c) drop (d) cancel

	ANS:- (c) drop
29	In the following statement, if column ‘mark’ already exists in the DataFrame ‘Df1’ then the assignment statement will ___________ Df1['mark'] = [95,98,100] #There are only three rows in DataFrame Df1 (i) Return error (ii) Replace the already existing values. (iii)Add new column (iv)None of the above ANS: (**ii) Replace the already existing values.**
30	To skip first 5 rows of CSV file, which argument will you give in read_csv( ) ? (a) skip_rows = 5 (b) skiprows = 5 (c) skip - 5 (d) noread - 5 **ANS:- (a) skip_rows = 5**
31	. Which of the following statement is false: i. DataFrame is size mutable ii. DataFrame is value mutable iii. DataFrame is immutable iv. DataFrame is capable of holding multiple types of data **ANS:- iii. DataFrame is immutable**
32	Which of the following statements is false? (i) Dataframe is size mutable (ii) Dataframe is value mutable (iii) Dataframe is immutable (iv) Dataframe is capable of holding multiple type of data A**NS: (iii) Dataframe is immutable**
33	To delete a row, the parameter axis of function drop( ) is assigned the value _______________ (i) 0 (ii) 1 (iii) 2 (iv) 3 **ANS: (i) 0**
34	Which of the following function is used to load the data from the CSV file to DataFrame? (i) read.csv( ) (ii) readcsv( ) (iii)read_csv( )

	(iv)Read_csv( ) **ANS: (iii)read_csv( )**
35	Write code to delete rows those getting 5000 salary. (a) df=df.drop[salary==5000] (b) df=df[df.salary!=5000] (c) df.drop[df.salary==5000,axis=0] (d) df=df.drop[salary!=5000] **ANS: (b) df=df[df.salary!=5000]**
36	DF1.loc[ ] method is used to ______ # DF1 is a DataFrame (i) Add new row in a DataFrame 'DF1' (ii) To change the data values of a row to a particular value (iii)Both of the above (iv)None of the above **ANS: (iii)Both of the above**
37	To iterate over horizontal subsets of dataframe, (a) iterate( ) (b) iterrows( ) function may be used. (c) itercols( ) (d) iteritems( ) **ANS:- (b) iterrows( ) function may be used.**
38	Write code to delete the row whose index value is A1 from dataframe df. (a) df=df.drop('A1') (b) df=df.drop(index='A1') (c) df=df.drop('A1,axis=index') (d) df=df.del('A1') **ANS: (a) df=df.drop('A1')**
39	A two-dimension labeled array that is an ordered collection of columns to store heterogeneous data type is i. Series ii. ii. Numpy array iii. iii. Dataframe iv. iv. Panel **ANS:- iii. Dataframe**
40	To skip 1st, 3rd and 5th rows of CSV file, which argument will you give in read_csv( ) ? (a) skiprows = 11315 (b) skiprows - (1, 3, 5]

	(c) skiprows = [1, 5, 1] (d) Any of these **ANS:- (b) skiprows - (1, 3, 5**]
41	In Pandas _______________ is used to store data in multiple columns. (i)Series (ii) DataFrame (iii) Both of the above (iv) None of the above **ANS: (ii) DataFrame**
42	What is dataframe? a. 2 D array with heterogeneous data b. 1 D array with homogeneous data c. 2 D array with homogeneous data d. 1 D array with heterogeneous data **ANS: a. 2 D array with heterogeneous data**
43	In a DataFrame, Axis= 1 represents the_____________ elements (a) Row (b) Column (c) True (d) False **ANS: (b) Column**
44	Which of the following is not an attribute of a DataFrame Object ? a. index b. Index c. size d. value **ANS: b. Index**
45	To get top 5 rows of a dataframe, you may use (a) head( ) (b) head(5) (c) top( ) (d) top(5) **ANS:- (a) head( ) , b) head(5)**
46	27. To iterate over horizontal subsets of dataframe, (a) iterate( ) (b) iterrows( ) function may be used. (c) itercols( ) (d) iteritems( )

	ANS:- (b) iterrows( ) function may be used.
47	Write code to delete the row whose index value is A1 from dataframe df. (a) df=df.drop('A1') (b) df=df.drop(index='A1') (c) df=df.drop('A1,axis=index') (d) df=df.del('A1') **ANS: (a) df=df.drop('A1')**
48	A two-dimension labelled array that is an ordered collection of columns to store heterogeneous datatype is v. Series vi. ii. Numpy array vii. iii. Dataframe viii. iv. Panel **ANS:- iii. Dataframe**
49	To skip 1st, 3rd and 5th rows of CSV file, which argument will you give in read_csv( ) ? (a) skiprows = 11315 (b) skiprows - (1, 3, 5] (c) skiprows = [1, 5, 1] (d) Any of these **ANS:- (b) skiprows - (1, 3, 5]**
50	In a DataFrame, Axis= 1 represents the______________ elements (a) Row (b) Column (c) True (d) False **ANS: (b) Column**
51	NaN stands for: a. Not a Number b. None and None c. Null and Null d. None a Number **ANS: a. Not a Number**
52	To get top 5 rows of a dataframe, you may use (a) head( ) (b) head(5) (c) top( ) (d) top(5) **ANS:- (a) head( ) , b) head(5)**
53	The correct statement to read from a CSV file in a dataframeis : (a) .read_csv()

	(b) . read_csv( )() (c) = pandas.read() (d) = pandas.read_csv() **ANS:- (d) = pandas.read_csv()**
54	To delete a column from a dataframe, you may use ______ statement. i. remove() ii. ii. del() iii. iii. drop() iv. iv. cancel() **ANS:- iii. drop()**
55	The following code create a dataframe named 'Df1' with _______________ columns. import pandas as pd Df1 = pd.DataFrame([10,20,30]) (i) 1 (ii) 2 (iii) 3 (iv) 4 **ANS: (i) 1**
56	To delete a row from dataframe, you may use _______ statement. i. remove() ii. ii. del() iii. iii. drop() iv. iv. cancel() **ANS:- ii. del()**
57	In a Data-Frame, Axis= 0 represents the elements along the______ a. Row b. Column c. Row and Column Both d. None of the above **ANS: a. Row**
58	___________ method in Pandas can be used to change the index of rows and columns of a Series or Dataframe (a) rename() (b) reindex() (c) reframe() (d) none of these **ANS: (b) reindex()**
59	Write the single line command to delete the column "marks" from dataframe df using drop function. (a) df=df.drop(col='marks')

<table>
<tr><td></td><td>(b) df=df.drop(‘marks’,axis=col)
(c) df=df.drop(‘marks’,axis=0)
(d) df=df.drop(‘marks’,axis=1)

ANS: (d) df=df.drop(‘marks’,axis=1)</td></tr>
<tr><td>60</td><td>Which of the following is used to give user defined column index in DataFrame?
(i) index
(ii) column
(iii) columns
(iv) colindex

ANS: (iii) columns</td></tr>
<tr><td>61</td><td>The following statement will _________
df = df.drop(['Name', 'Class', 'Rollno'], axis = 1) #df is a DataFrame object

a. delete three columns having labels ‘Name’, ‘Class’ and ‘Rollno’
b. delete three rows having labels ‘Name’, ‘Class’ and ‘Rollno’
c. delete any three columns
d. return error

ANS:- a. delete three columns having labels ‘Name’, ‘Class’ and ‘Rollno’</td></tr>
<tr><td>62</td><td>Difference between loc() and iloc().:
a. Both are Label indexed based functions.
b. Both are Integer position-based functions.
c. loc() is label based function and iloc() integer position based function.
d. loc() is integer position based function and iloc() index position based function.

ANS: c. loc() is label based function and iloc() integer position based function.</td></tr>
<tr><td>63</td><td>Which command will be used to delete 3 and 5 rows of the data frame. Assuming the data frame name as DF.
a. DF.drop([2,4],axis=0)
b. DF.drop([2,4],axis=1)
c. DF.drop([3,5],axis=1)
d. DF.drop([3,5])

ANS: a DF.drop([2,4],axis=0)</td></tr>
<tr><td>64</td><td>Assuming the given structure, which command will give us the given output:
Output Required: (3,4)

<table>
<tr><th></th><th>EmpCode</th><th>Name</th><th>Desig</th></tr>
<tr><td>0</td><td>1405</td><td>VINAY</td><td>Clerk</td></tr>
<tr><td>1</td><td>1985</td><td>MANISH</td><td>Works Manager</td></tr>
<tr><td>2</td><td>1636</td><td>SMINA</td><td>Sales Manager</td></tr>
<tr><td>3</td><td>1689</td><td>RINU</td><td>Cleark</td></tr>
</table>
a. print(df.shape())
b. print(df.shape)</td></tr>
</table>

<table>
<tr><td></td><td>c. print(df.size)
d. print(df.size()).

ANS: b. print(df.shape)</td></tr>
<tr><td>65</td><td><i>Write the output of the given command: df1.loc[:0,'Name'] Consider the given dataframe.</i>
<table>
<tr><th></th><th><i>EmpCode</i></th><th><i>Name</i></th><th><i>Desig</i></th></tr>
<tr><td><i>0</i></td><td><i>1405</i></td><td><i>VINAY</i></td><td><i>Clerk</i></td></tr>
<tr><td><i>1</i></td><td><i>1985</i></td><td><i>MANISH</i></td><td><i>Works Manager</i></td></tr>
<tr><td><i>2</i></td><td><i>1636</i></td><td><i>SMINA</i></td><td><i>Sales Manager</i></td></tr>
<tr><td><i>3</i></td><td><i>1689</i></td><td><i>RINU</i></td><td><i>Clerk</i></td></tr>
</table>
<i>a. 0 1405 VINAY Clerk</i>
<i>b. VINAY</i>
<i>c. Works Manager</i>
<i>d. Clerk</i>
<i>ANS : VINAY</i></td></tr>
</table>

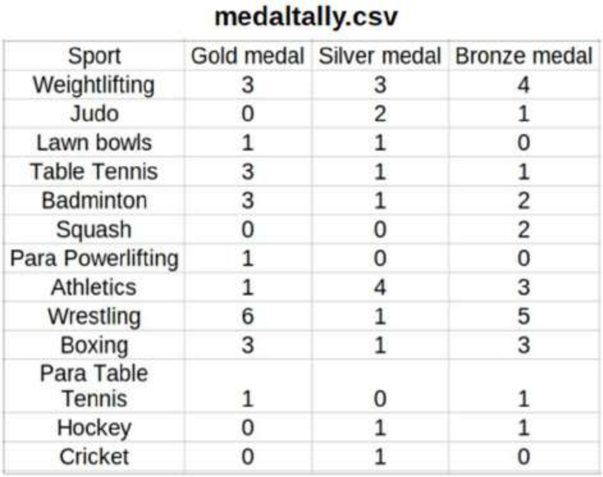
Index

Importing/Exporting Data between CSV files and Data Frames

Basics of CSV Files

- CSV Files : A CSV file is a delimited value file. All CSV files are simple text files, can contain only numbers and letters and structure the data contained in them in tabular form.
- Files with the CSV extension are usually used to exchange data between different applications. Database programs, analytical software, and other applications that store large amounts of information (for example, contacts and customer data) usually support the CSV format.
- All CSV files have the same general format: each column is separated by a comma and each new row indicates a new row. Some programs that export data to a CSV file may use a different character to separate values, such as a tab, semicolon, or space.
- For example consider the data regarding medals won by India at Commonwealth Games 2022 stored in a csv file medaltally.csv created using a spreadsheet software like Microsoft Excel or Libreoffice Calc.

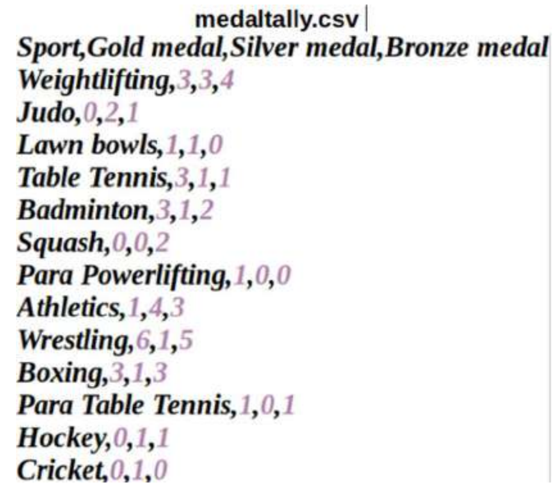
When opened with spreadsheet like Excel.



medaltally.csv

Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3	1	1
Badminton	3	1	2
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	3
Wrestling	6	1	5
Boxing	3	1	3
Para Table Tennis	1	0	1
Hockey	0	1	1
Cricket	0	1	0

When opened with text editor like Notepad.



medaltally.csv

```
Sport,Gold medal,Silver medal,Bronze medal
Weightlifting,3,3,4
Judo,0,2,1
Lawn bowls,1,1,0
Table Tennis,3,1,1
Badminton,3,1,2
Squash,0,0,2
Para Powerlifting,1,0,0
Athletics,1,4,3
Wrestling,6,1,5
Boxing,3,1,3
Para Table Tennis,1,0,1
Hockey,0,1,1
Cricket,0,1,0
```

Importing CSV Files to Dataframes

pandas.read_csv is used to read a comma-separated values (csv) file into DataFrame.

pandas.read_csv(_filepath_**,** _sep=','_**,** _header='infer'_**,** _names=NoDefault.no_default_**,** _index_col=None, skiprows=None, skipfooter=0, nrows=None_**)**

Parameters

filepath :str, path object or file-like object

Any valid string path is acceptable. The string could be a URL.

sep :str, default ','

Delimiter to use.

header :int, list of int, None, default 'infer'

Row number(s) to use as the column names, and the start of the data. Default behavior is to infer the column names: if no names are passed the behavior is identical to header=0 and column names are inferred from the first line of the file, if column names are passed explicitly then the behavior is identical to header=None.

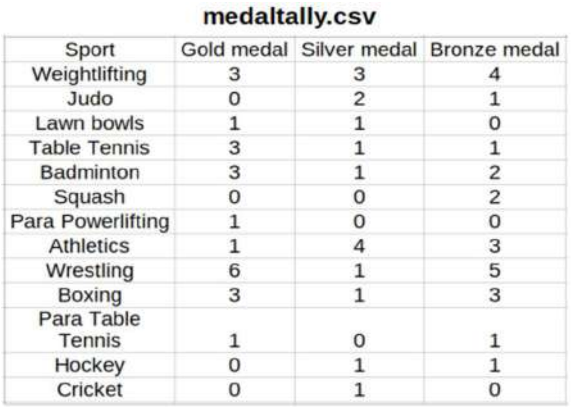
names : array-like, optional
List of column names to use. If the file contains a header row, then you should explicitly pass `header=0` to override the column names. Duplicates in this list are not allowed.

index_col : int, str, sequence of int / str, or False, optional, default None
Column(s) to use as the row labels of the DataFrame, either given as string name or column index.

skiprows : list-like, int
Line numbers to skip (0-indexed) or number of lines to skip (int) at the start of the file.

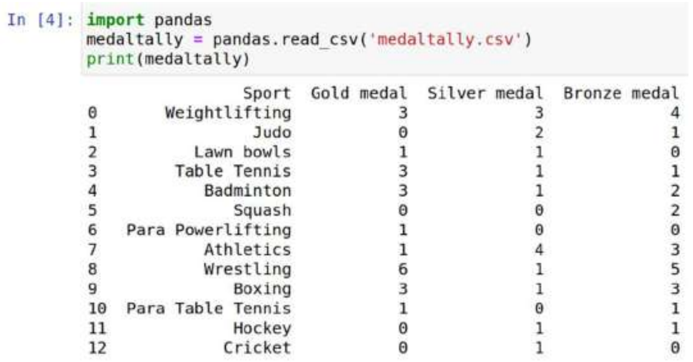
nrows: int, optional
Number of rows of file to read.

Example 1 : Consider the following file medaltally.csv. Here header argument is 0 and index_col is None. Hence index becomes 0,1,2,3,...,12 and first row as column labels.



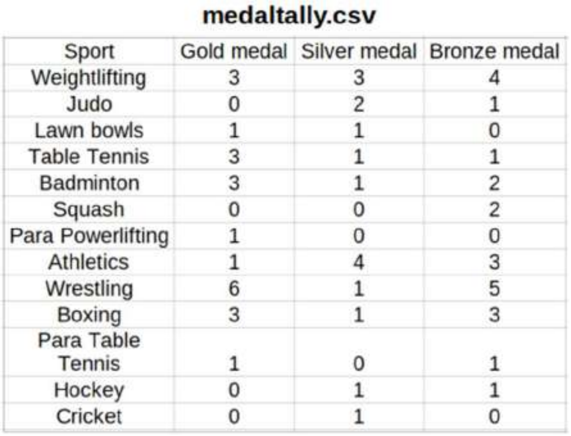
medaltally.csv

Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3	1	1
Badminton	3	1	2
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	3
Wrestling	6	1	5
Boxing	3	1	3
Para Table Tennis	1	0	1
Hockey	0	1	1
Cricket	0	1	0



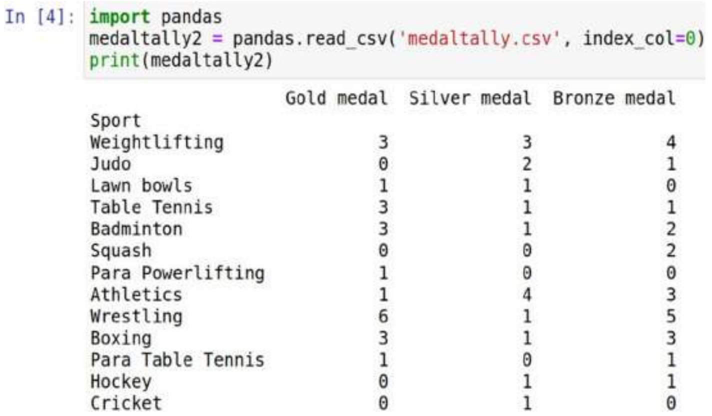
```
In [4]: import pandas
        medaltally = pandas.read_csv('medaltally.csv')
        print(medaltally)

                Sport  Gold medal  Silver medal  Bronze medal
0       Weightlifting           3             3             4
1                Judo           0             2             1
2          Lawn bowls           1             1             0
3        Table Tennis           3             1             1
4           Badminton           3             1             2
5              Squash           0             0             2
6   Para Powerlifting           1             0             0
7           Athletics           1             4             3
8           Wrestling           6             1             5
9              Boxing           3             1             3
10  Para Table Tennis           1             0             1
11             Hockey           0             1             1
12            Cricket           0             1             0
```

Example 2 : Consider the following file medaltally.csv. Here header argument is 0 and index_col is 0. Hence, first column values are taken as index labels and first row as column labels.



medaltally.csv

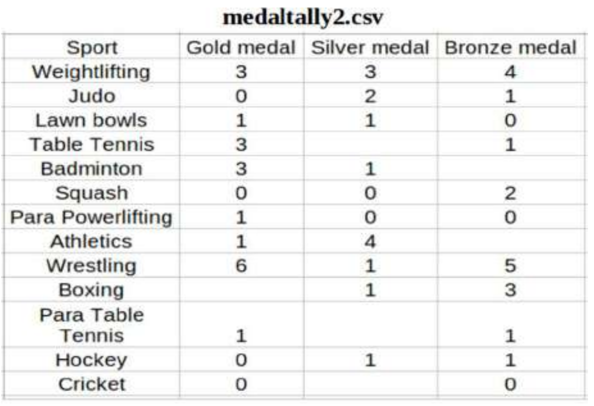
Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3	1	1
Badminton	3	1	2
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	3
Wrestling	6	1	5
Boxing	3	1	3
Para Table Tennis	1	0	1
Hockey	0	1	1
Cricket	0	1	0



```
In [4]: import pandas
        medaltally2 = pandas.read_csv('medaltally.csv', index_col=0)
        print(medaltally2)

                   Gold medal  Silver medal  Bronze medal
Sport
Weightlifting               3             3             4
Judo                        0             2             1
Lawn bowls                  1             1             0
Table Tennis                3             1             1
Badminton                   3             1             2
Squash                      0             0             2
Para Powerlifting           1             0             0
Athletics                   1             4             3
Wrestling                   6             1             5
Boxing                      3             1             3
Para Table Tennis           1             0             1
Hockey                      0             1             1
Cricket                     0             1             0
```

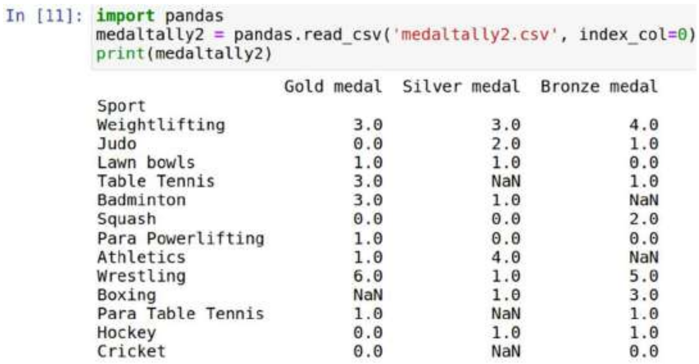
Note: 'Sport' is not an index. It is medaltally2.index.name

Example 3 : Consider the following file medaltally2.csv with the data regarding some events missing. Those missing data are read as NaN.



medaltally2.csv

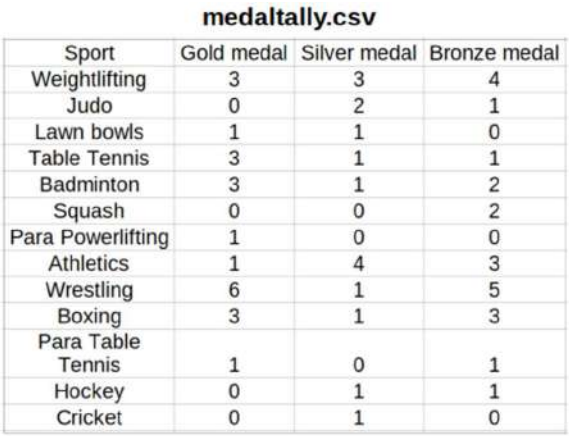
Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3		1
Badminton	3	1	
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	
Wrestling	6	1	5
Boxing		1	3
Para Table Tennis	1		1
Hockey	0	1	1
Cricket	0		0



```
In [11]: import pandas
         medaltally2 = pandas.read_csv('medaltally2.csv', index_col=0)
         print(medaltally2)

                   Gold medal  Silver medal  Bronze medal
Sport
Weightlifting             3.0           3.0           4.0
Judo                      0.0           2.0           1.0
Lawn bowls                1.0           1.0           0.0
Table Tennis              3.0           NaN           1.0
Badminton                 3.0           1.0           NaN
Squash                    0.0           0.0           2.0
Para Powerlifting         1.0           0.0           0.0
Athletics                 1.0           4.0           NaN
Wrestling                 6.0           1.0           5.0
Boxing                    NaN           1.0           3.0
Para Table Tennis         1.0           NaN           1.0
Hockey                    0.0           1.0           1.0
Cricket                   0.0           NaN           0.0
```

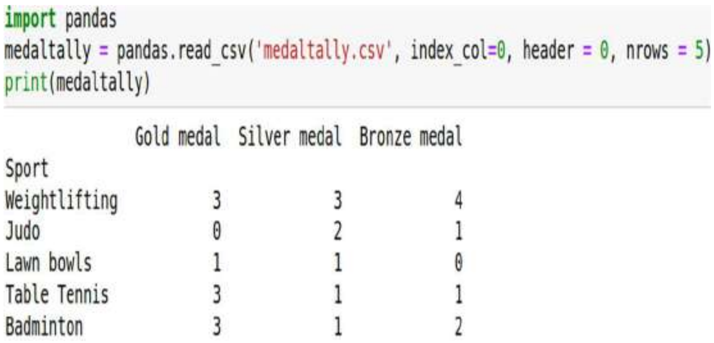
Note: 'Sport' is not an index. It is medaltally2.index.name

Example 4 : Consider the following file medaltally.csv read with only first 5 rows to be read.



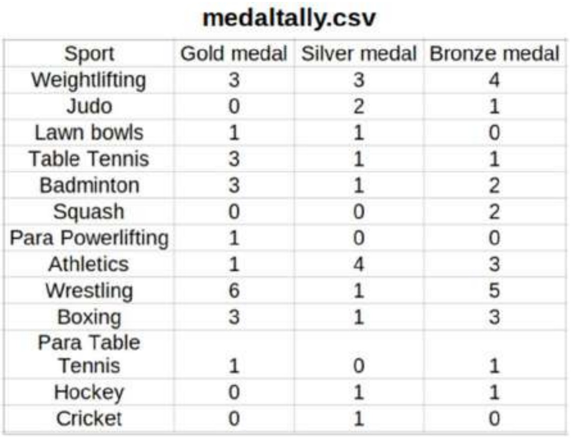
medaltally.csv

Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3	1	1
Badminton	3	1	2
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	3
Wrestling	6	1	5
Boxing	3	1	3
Para Table Tennis	1	0	1
Hockey	0	1	1
Cricket	0	1	0



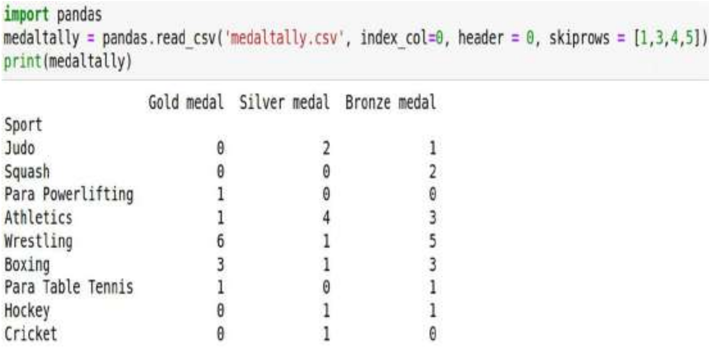
```
import pandas
medaltally = pandas.read_csv('medaltally.csv', index_col=0, header = 0, nrows = 5)
print(medaltally)

               Gold medal  Silver medal  Bronze medal
Sport
Weightlifting           3             3             4
Judo                    0             2             1
Lawn bowls              1             1             0
Table Tennis            3             1             1
Badminton               3             1             2
```

Example 5 : Consider the following file medaltally.csv to be read with rows 1,3,4,5 to be skipped.



medaltally.csv

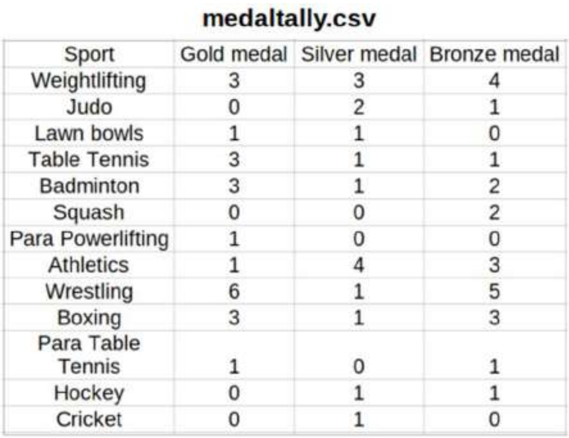
Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3	1	1
Badminton	3	1	2
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	3
Wrestling	6	1	5
Boxing	3	1	3
Para Table Tennis	1	0	1
Hockey	0	1	1
Cricket	0	1	0



```
import pandas
medaltally = pandas.read_csv('medaltally.csv', index_col=0, header = 0, skiprows = [1,3,4,5])
print(medaltally)

                   Gold medal  Silver medal  Bronze medal
Sport
Judo                        0             2             1
Squash                      0             0             2
Para Powerlifting           1             0             0
Athletics                   1             4             3
Wrestling                   6             1             5
Boxing                      3             1             3
Para Table Tennis           1             0             1
Hockey                      0             1             1
Cricket                     0             1             0
```

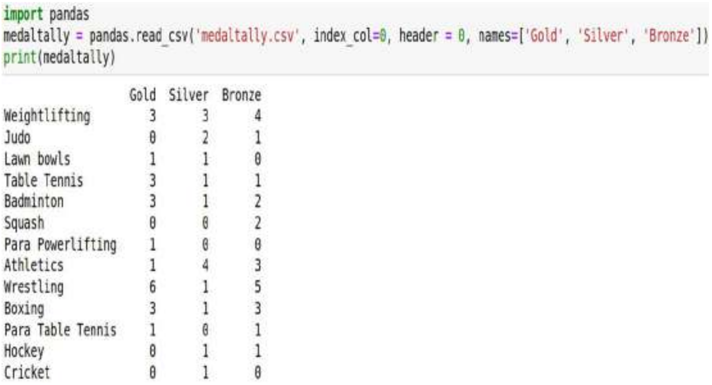
Here rows numbers are taken as weightlifting 1, Judo 2, and so on.

Example 6 Consider the following file medaltally.csv to be read with user specified column names 'Gold', 'Silver', and 'Bronze'.



medaltally.csv

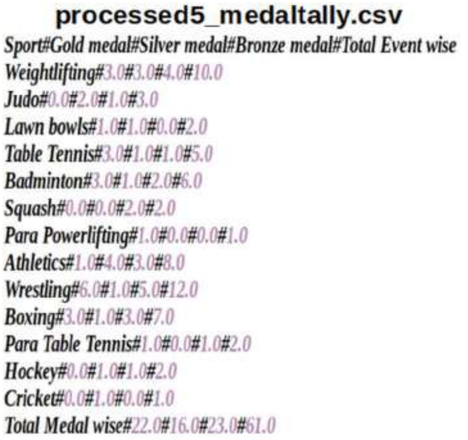
Sport	Gold medal	Silver medal	Bronze medal
Weightlifting	3	3	4
Judo	0	2	1
Lawn bowls	1	1	0
Table Tennis	3	1	1
Badminton	3	1	2
Squash	0	0	2
Para Powerlifting	1	0	0
Athletics	1	4	3
Wrestling	6	1	5
Boxing	3	1	3
Para Table Tennis	1	0	1
Hockey	0	1	1
Cricket	0	1	0



```
import pandas
medaltally = pandas.read_csv('medaltally.csv', index_col=0, header = 0, names=['Gold', 'Silver', 'Bronze'])
print(medaltally)

                   Gold  Silver  Bronze
Weightlifting         3       3       4
Judo                  0       2       1
Lawn bowls            1       1       0
Table Tennis          3       1       1
Badminton             3       1       2
Squash                0       0       2
Para Powerlifting     1       0       0
Athletics             1       4       3
Wrestling             6       1       5
Boxing                3       1       3
Para Table Tennis     1       0       1
Hockey                0       1       1
Cricket               0       1       0
```

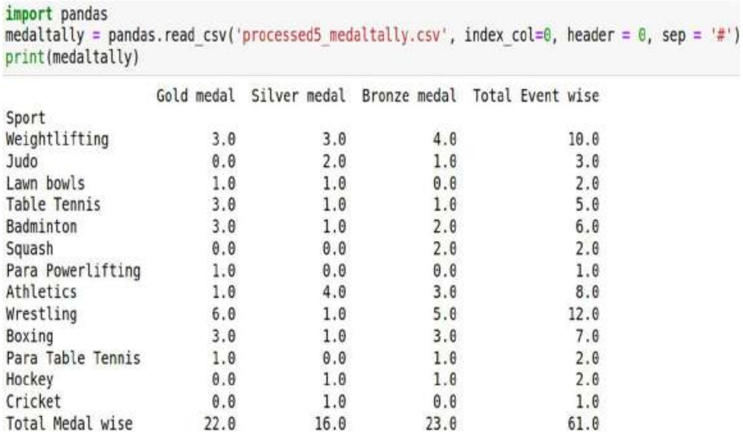
Note : Here rows numbers are taken as weightlifting 1, Judo 2, and so on.

Example 7 : Consider the following file processed5_medaltally.csv to be read with separator as '#'.



processed5_medaltally.csv

```
Sport#Gold medal#Silver medal#Bronze medal#Total Event wise
Weightlifting#3.0#3.0#4.0#10.0
Judo#0.0#2.0#1.0#3.0
Lawn bowls#1.0#1.0#0.0#2.0
Table Tennis#3.0#1.0#1.0#5.0
Badminton#3.0#1.0#2.0#6.0
Squash#0.0#0.0#2.0#2.0
Para Powerlifting#1.0#0.0#0.0#1.0
Athletics#1.0#4.0#3.0#8.0
Wrestling#6.0#1.0#5.0#12.0
Boxing#3.0#1.0#3.0#7.0
Para Table Tennis#1.0#0.0#1.0#2.0
Hockey#0.0#1.0#1.0#2.0
Cricket#0.0#1.0#0.0#1.0
Total Medal wise#22.0#16.0#23.0#61.0
```



```
import pandas
medaltally = pandas.read_csv('processed5_medaltally.csv', index_col=0, header = 0, sep = '#')
print(medaltally)

                   Gold medal  Silver medal  Bronze medal  Total Event wise
Sport
Weightlifting             3.0           3.0           4.0              10.0
Judo                      0.0           2.0           1.0               3.0
Lawn bowls                1.0           1.0           0.0               2.0
Table Tennis              3.0           1.0           1.0               5.0
Badminton                 3.0           1.0           2.0               6.0
Squash                    0.0           0.0           2.0               2.0
Para Powerlifting         1.0           0.0           0.0               1.0
Athletics                 1.0           4.0           3.0               8.0
Wrestling                 6.0           1.0           5.0              12.0
Boxing                    3.0           1.0           3.0               7.0
Para Table Tennis         1.0           0.0           1.0               2.0
Hockey                    0.0           1.0           1.0               2.0
Cricket                   0.0           1.0           0.0               1.0
Total Medal wise         22.0          16.0          23.0              61.0
```

Exporting Dataframes to CSV Files

DataFrame.to_csv(*path = None***,** *sep=','***,** *na_rep=''***,** *header=True***,** *index=True***)**

DataFrame.to_csv is used to write a pandas object to a comma-separated values (csv) file.Parameters

path : str, default None
String

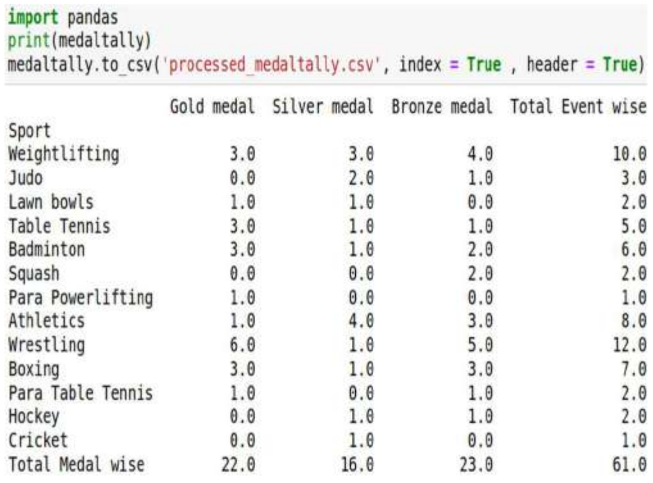
sep :str, default ','
String of length 1. Field delimiter for the output file.

na_rep : str, default ''
Missing data representation.

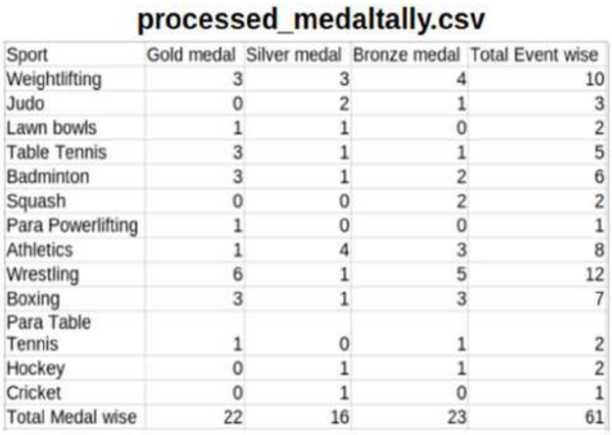
header : bool or list of str, default True
Write out the column names. If a list of strings is given it is assumed to be aliases for the column names.

index :bool, default True
Write row names (index).

Example 1 : Consider the dataframe medaltally. Here header and index arguments are True; Hence the index and column labels are written to the csv file processed_medaltally.csv.



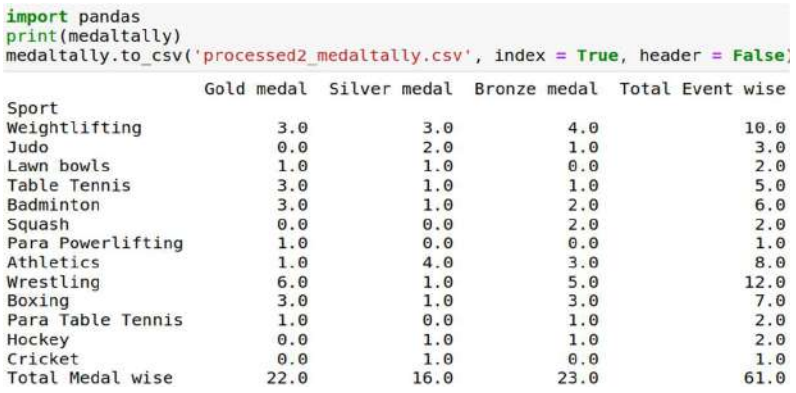
```
import pandas
print(medaltally)
medaltally.to_csv('processed_medaltally.csv', index = True , header = True)

                   Gold medal  Silver medal  Bronze medal  Total Event wise
Sport
Weightlifting             3.0           3.0           4.0              10.0
Judo                      0.0           2.0           1.0               3.0
Lawn bowls                1.0           1.0           0.0               2.0
Table Tennis              3.0           1.0           1.0               5.0
Badminton                 3.0           1.0           2.0               6.0
Squash                    0.0           0.0           2.0               2.0
Para Powerlifting         1.0           0.0           0.0               1.0
Athletics                 1.0           4.0           3.0               8.0
Wrestling                 6.0           1.0           5.0              12.0
Boxing                    3.0           1.0           3.0               7.0
Para Table Tennis         1.0           0.0           1.0               2.0
Hockey                    0.0           1.0           1.0               2.0
Cricket                   0.0           1.0           0.0               1.0
Total Medal wise         22.0          16.0          23.0              61.0
```



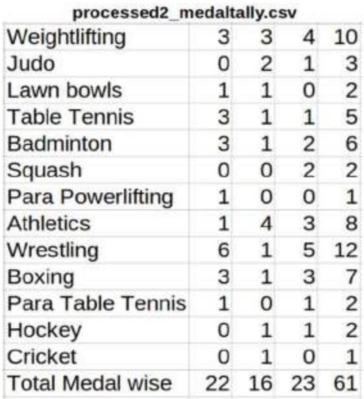
processed_medaltally.csv

Sport	Gold medal	Silver medal	Bronze medal	Total Event wise
Weightlifting	3	3	4	10
Judo	0	2	1	3
Lawn bowls	1	1	0	2
Table Tennis	3	1	1	5
Badminton	3	1	2	6
Squash	0	0	2	2
Para Powerlifting	1	0	0	1
Athletics	1	4	3	8
Wrestling	6	1	5	12
Boxing	3	1	3	7
Para Table Tennis	1	0	1	2
Hockey	0	1	1	2
Cricket	0	1	0	1
Total Medal wise	22	16	23	61

Example 2 : Consider the dataframe medaltally. Here header is False and index argument is True; Hence the columns labels are not present in file processed2_medaltally.csv.



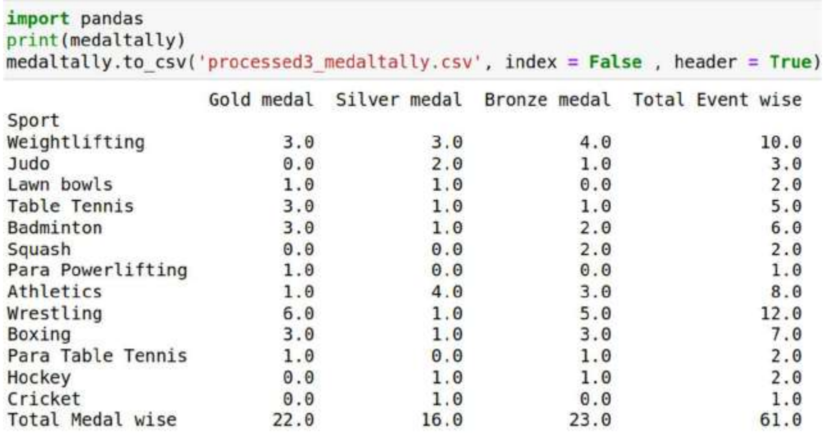
```
import pandas
print(medaltally)
medaltally.to_csv('processed2_medaltally.csv', index = True, header = False)

                   Gold medal  Silver medal  Bronze medal  Total Event wise
Sport
Weightlifting             3.0           3.0           4.0              10.0
Judo                      0.0           2.0           1.0               3.0
Lawn bowls                1.0           1.0           0.0               2.0
Table Tennis              3.0           1.0           1.0               5.0
Badminton                 3.0           1.0           2.0               6.0
Squash                    0.0           0.0           2.0               2.0
Para Powerlifting         1.0           0.0           0.0               1.0
Athletics                 1.0           4.0           3.0               8.0
Wrestling                 6.0           1.0           5.0              12.0
Boxing                    3.0           1.0           3.0               7.0
Para Table Tennis         1.0           0.0           1.0               2.0
Hockey                    0.0           1.0           1.0               2.0
Cricket                   0.0           1.0           0.0               1.0
Total Medal wise         22.0          16.0          23.0              61.0
```



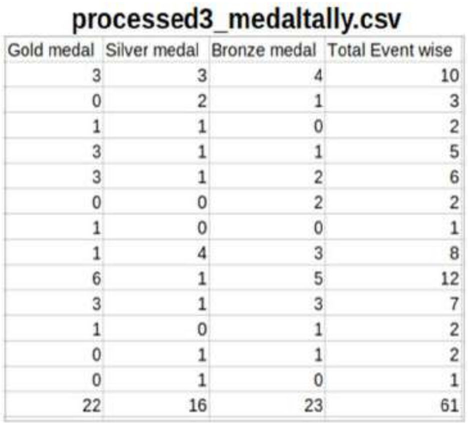
processed2_medaltally.csv

Weightlifting	3	3	4	10
Judo	0	2	1	3
Lawn bowls	1	1	0	2
Table Tennis	3	1	1	5
Badminton	3	1	2	6
Squash	0	0	2	2
Para Powerlifting	1	0	0	1
Athletics	1	4	3	8
Wrestling	6	1	5	12
Boxing	3	1	3	7
Para Table Tennis	1	0	1	2
Hockey	0	1	1	2
Cricket	0	1	0	1
Total Medal wise	22	16	23	61

Example 3 : Consider the dataframe medaltally. Here header is True and index argument is False; Hence the index labels are not present in the file processed3_medaltally.csv but column labels are present.



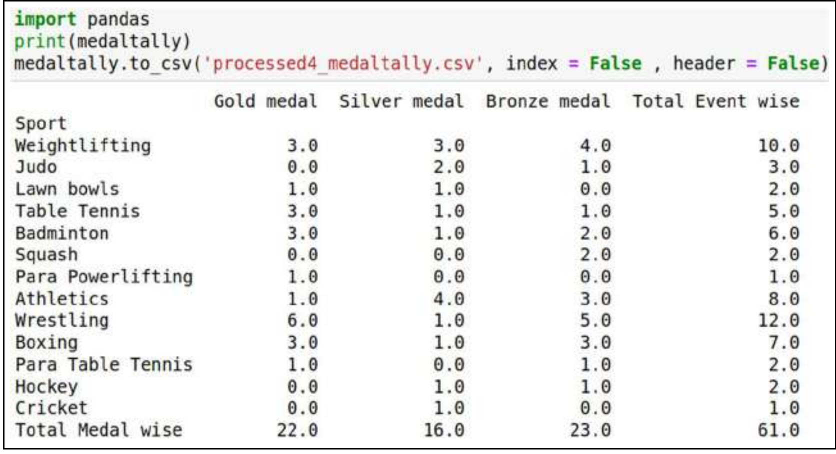
```
import pandas
print(medaltally)
medaltally.to_csv('processed3_medaltally.csv', index = False , header = True)

                   Gold medal  Silver medal  Bronze medal  Total Event wise
Sport
Weightlifting             3.0           3.0           4.0              10.0
Judo                      0.0           2.0           1.0               3.0
Lawn bowls                1.0           1.0           0.0               2.0
Table Tennis              3.0           1.0           1.0               5.0
Badminton                 3.0           1.0           2.0               6.0
Squash                    0.0           0.0           2.0               2.0
Para Powerlifting         1.0           0.0           0.0               1.0
Athletics                 1.0           4.0           3.0               8.0
Wrestling                 6.0           1.0           5.0              12.0
Boxing                    3.0           1.0           3.0               7.0
Para Table Tennis         1.0           0.0           1.0               2.0
Hockey                    0.0           1.0           1.0               2.0
Cricket                   0.0           1.0           0.0               1.0
Total Medal wise         22.0          16.0          23.0              61.0
```



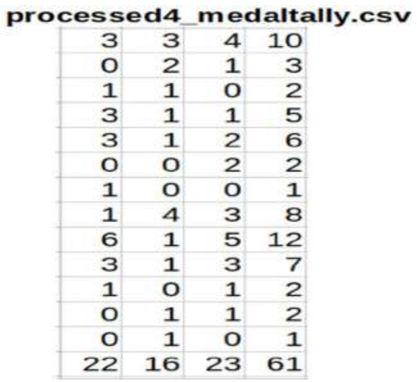
processed3_medaltally.csv

Gold medal	Silver medal	Bronze medal	Total Event wise
3	3	4	10
0	2	1	3
1	1	0	2
3	1	1	5
3	1	2	6
0	0	2	2
1	0	0	1
1	4	3	8
6	1	5	12
3	1	3	7
1	0	1	2
0	1	1	2
0	1	0	1
22	16	23	61

Example 4 : Consider the dataframe medaltally. Here header is False and index argument is False; Hence the index labels as well as the header are not present in written file processed4_medaltally.csv. Only data is present in the file processed4_medaltally.csv.



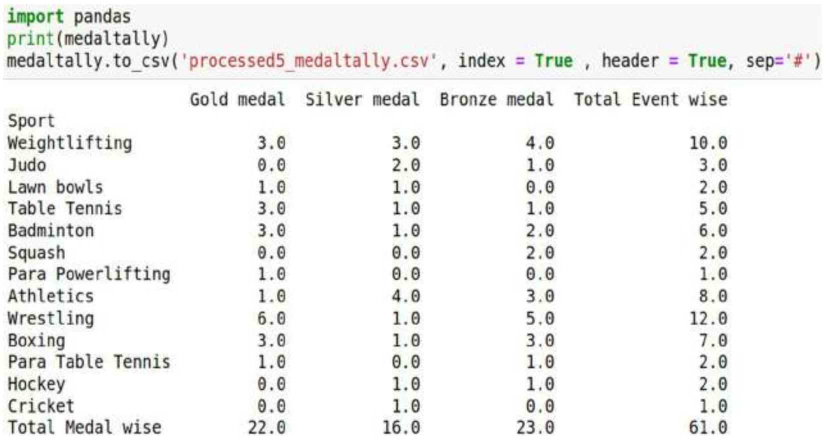
```
import pandas
print(medaltally)
medaltally.to_csv('processed4_medaltally.csv', index = False , header = False)

                    Gold medal  Silver medal  Bronze medal  Total Event wise
Sport
Weightlifting              3.0           3.0           4.0              10.0
Judo                       0.0           2.0           1.0               3.0
Lawn bowls                 1.0           1.0           0.0               2.0
Table Tennis               3.0           1.0           1.0               5.0
Badminton                  3.0           1.0           2.0               6.0
Squash                     0.0           0.0           2.0               2.0
Para Powerlifting          1.0           0.0           0.0               1.0
Athletics                  1.0           4.0           3.0               8.0
Wrestling                  6.0           1.0           5.0              12.0
Boxing                     3.0           1.0           3.0               7.0
Para Table Tennis          1.0           0.0           1.0               2.0
Hockey                     0.0           1.0           1.0               2.0
Cricket                    0.0           1.0           0.0               1.0
Total Medal wise          22.0          16.0          23.0              61.0
```



processed4_medaltally.csv

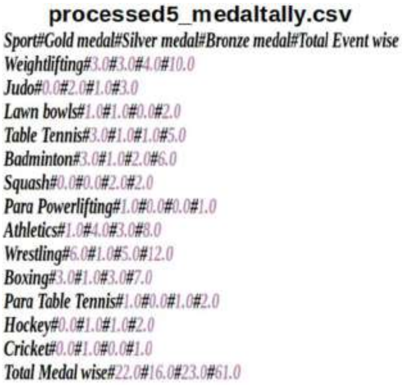
3	3	4	10
0	2	1	3
1	1	0	2
3	1	1	5
3	1	2	6
0	0	2	2
1	0	0	1
1	4	3	8
6	1	5	12
3	1	3	7
1	0	1	2
0	1	1	2
0	1	0	1
22	16	23	61

Example 5 : Consider the dataframe medaltally. The default delimiter ',' in a csv file can be changed by setting the sep argument in to_csv. Here delimiter is changed to '#'.



```
import pandas
print(medaltally)
medaltally.to_csv('processed5_medaltally.csv', index = True , header = True, sep='#')

                    Gold medal  Silver medal  Bronze medal  Total Event wise
Sport
Weightlifting              3.0           3.0           4.0              10.0
Judo                       0.0           2.0           1.0               3.0
Lawn bowls                 1.0           1.0           0.0               2.0
Table Tennis               3.0           1.0           1.0               5.0
Badminton                  3.0           1.0           2.0               6.0
Squash                     0.0           0.0           2.0               2.0
Para Powerlifting          1.0           0.0           0.0               1.0
Athletics                  1.0           4.0           3.0               8.0
Wrestling                  6.0           1.0           5.0              12.0
Boxing                     3.0           1.0           3.0               7.0
Para Table Tennis          1.0           0.0           1.0               2.0
Hockey                     0.0           1.0           1.0               2.0
Cricket                    0.0           1.0           0.0               1.0
Total Medal wise          22.0          16.0          23.0              61.0
```

File opened in text editor

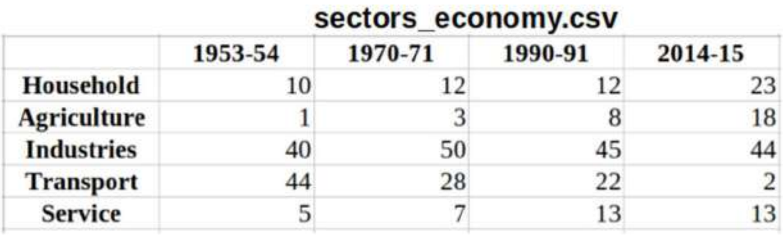


processed5_medaltally.csv

```
Sport#Gold medal#Silver medal#Bronze medal#Total Event wise
Weightlifting#3.0#3.0#4.0#10.0
Judo#0.0#2.0#1.0#3.0
Lawn bowls#1.0#1.0#0.0#2.0
Table Tennis#3.0#1.0#1.0#5.0
Badminton#3.0#1.0#2.0#6.0
Squash#0.0#0.0#2.0#2.0
Para Powerlifting#1.0#0.0#0.0#1.0
Athletics#1.0#4.0#3.0#8.0
Wrestling#6.0#1.0#5.0#12.0
Boxing#3.0#1.0#3.0#7.0
Para Table Tennis#1.0#0.0#1.0#2.0
Hockey#0.0#1.0#1.0#2.0
Cricket#0.0#1.0#0.0#1.0
Total Medal wise#22.0#16.0#23.0#61.0
```

Exercises

1. Given the following csv file which of the command will correctly read the details into a dataframe from csv file sectors_economy.csv.



sectors_economy.csv

	1953-54	1970-71	1990-91	2014-15
Household	10	12	12	23
Agriculture	1	3	8	18
Industries	40	50	45	44
Transport	44	28	22	2
Service	5	7	13	13

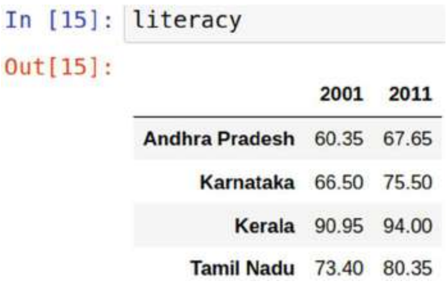
a. pandas.read_csv('sectors_economy.csv', header = 0, index_col = 0)

b. pandas.read_csv('sectors_economy.csv', header = 0, index_col = 1)

c. pandas.read_csv('sectors_economy.csv', header = 1, index_col = 0)

d. pandas.read_csv('sectors_economy.csv', header = 1, index_col = 1)

Consider the following dataframe ***literacy*** for questions 2 and 3.



```
In [15]: literacy
Out[15]:
```

	2001	2011
Andhra Pradesh	60.35	67.65
Karnataka	66.50	75.50
Kerala	90.95	94.00
Tamil Nadu	73.40	80.35

2. Which of the commands will correctly write literacy to literacy.csv with index and column labels.

a. literacy.to_csv("literacy.csv", index = False, header = False)

b. literacy.to_csv("literacy.csv", index = True, header = False)

c. literacy.to_csv("literacy.csv", index = False, header = True)

d. literacy.to_csv("literacy.csv", index = True, header = True)

3. Which of the commands will correctly write literacy to literacy.csv without index and column labels i.e the data alone.

a. literacy.to_csv("literacy.csv", index = False, header = False)

b. literacy.to_csv("literacy.csv", index = True, header = False)

c. literacy.to_csv("literacy.csv", index = False, header = True)

d. literacy.to_csv("literacy.csv", index = True, header = True)

4. Which of the arguments needs to be set so that the index labels will be written into literacy.csv.

a. indexb. header c. index_col d. header_row

5. The argument to be set in read_csv for reading user specified number of rows from a csv file is:

a. rows b. row c. nrows d. nrow

Answers

1. a

2. d

3. a

4. a

5. c

Data Visualization

What is Data Visualization ?

Data visualization is the technique to present the data in a pictorial or graphical format. It enables stakeholders and decision makers to analyze data visually. The data in a graphical format allows them to identify new trends and patterns easily.

The main benefits of data visualization are as follows:

- ✓ It simplifies the complex quantitative information
- ✓ It helps analyze and explore big data easily
- ✓ It identifies the areas that need attention or improvement
- ✓ It identifies the relationship between data points and variables
- ✓ It explores new patterns and reveals hidden patterns in the data

Purpose of Data visualization:

- ➢ Better analysis
- ➢ Quick action
- ➢ Identifying patterns
- ➢ Finding errors
- ➢ Understanding the story
- ➢ Exploring business insights
- ➢ Grasping the Latest Trends

matplotlib Library and pyplot Interface

- The matplotlib is a python library that provides many interfaces functionally for 2D graphics
- In short we can call mattplotlib as a high quality plotting library of Python.
- The matplotlib library offers many different named collections of methods, pyplot is one such interface.
- pyplot is a collection of methods within matplotlib which allows user to construct

2D plots easily and interactively.

Installing matplotlib

It is done using pip command in **Command Prompt**

```
pip install matplotlib
```

Importing PyPlot

To import Pyplot following syntax is

import matplotlib.pyplot
or
import matplotlib.pyplot as plt

After importing matplotlib in the form of **plt** we can use **plt** for accessing any function of matplotlib

Steps to plot in matplotlib:

- Create a .py file & import matplotlib library to it using import statement

  import matplotlib.pyplot as plt

- Set data points in plot( ) method of plt object
- Customize plot by setting different parameters
- Call the show() method to display the plot
- Save the plot/graph if required

Types of plot using matplotlib

- **LINE PLOT**
- **BAR GRAPH**
- **HISTOGRAM etc.**

Line Plot:

A line plot/chart is a graph that shows the frequency of data occurring along a number line. The line plot is represented by a series of data points called **markers** connected with a straight line. Generally, line plots are used to display trends over time. A line plot or line graph can be created using the plot () function available in pyplot library.

We can, not only just plot a line but we can explicitly define the grid, the x and y axis scale and labels, title and display options etc.

Line chart: displaying data in form of lines.

- We can create line graph with x coordinate only or with x and y coordinates.
- Function to draw line chart – plot()
- Default colour of line- blue

- The default **width** for each bar is **.0.8** units, which can be changed.

- Syntax: plt.plot(x,y)

Line Plot customization

- **Custom line color**

plt.plot(x,y,'red')
Change the value in color argument like ‘b’ for blue,’r’,’c’,…..

- **Custom line style and line width**

plt.plot(x,y, linestyle='solid' , linewidth=4).
set linestyle to solid/dashed/dotted/dashdot
set linewidth as required

- **Title**

plt.title('DAY – TEMP Graph ') – Change it as per requirement

- **Label**-

plt.xlabel(‘TIme') – to set the x axis label
plt.ylabel(‘Temp') – to set the y axis label

- Changing Marker Type, Size and Color

plt.plot(x,y,'blue',marker='*',markersize=10,markeredgecolor='magenta')

Order of methods used in plot() function:

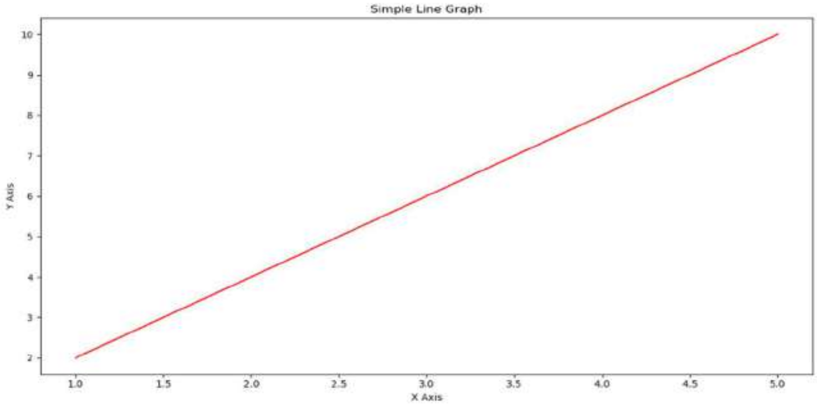
Plt.plot(x,y,color,linewidth,linestyle,marker, markersize,markeredgecolor)

Function used to show the graph – show()

plt.show( )

PROGRAM

```
import matplotlib.pyplot as plt
X=[1,2,3,4,5]
Y=[2,4,6,8,10]
plt.title('Simple Line Graph')
plt.xlabel('X Axis')
plt.ylabel('Y Axis')
plt.plot(X,Y,'r')
plt.show()
```



Bar Graph

A graph drawn using rectangular bars to show how large each value is. The bars can be horizontal or vertical. A bar graph makes it easy to compare data between different groups at a glance. Bar graph represents categories on one axis and a discrete value in the other. The goal of bar graph is to show the relationship between the two axes. Bar graph can also show big changes in data over time.

- Syntax : plt.bar(x,y)

Bar graph customization

- **Custom bar color**

  plt.bar(x,y, color="color code/color name")

To se different colors for different bars

  plt.bar(x,y, color="color code/color name sequence")

- **Custom bar width**

  plt.bar(x,y, width=float value)

To set different widths for different bars

  plt.bar(x,y, width=float value sequence)

- **Title**

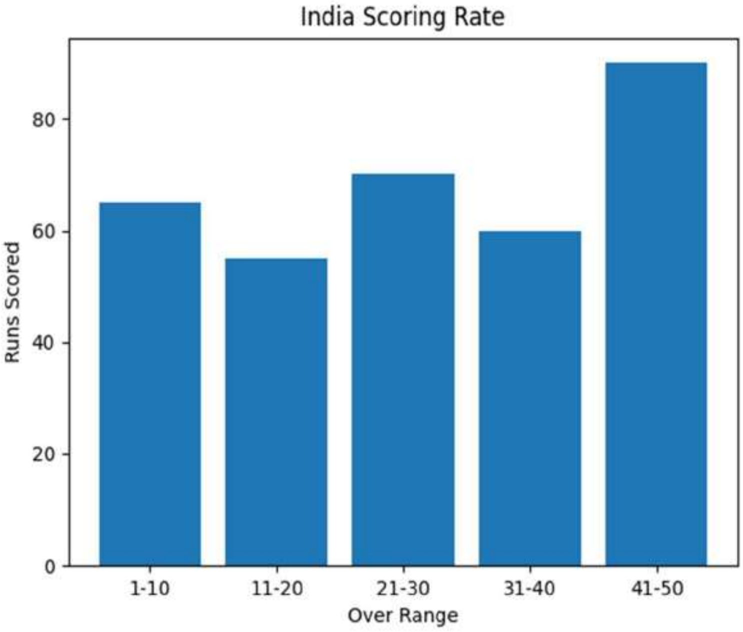
plt.title(' Bar Graph ') – Change it as per requirement

- **Label**-

  plt.xlabel(‘Overs') – to set the x axis label
  plt.ylabel(‘Runs') – to set the y axis label

PROGRAM :

```
import matplotlib.pyplot as plt
overs=['1-10','11-20','21-30','31-40','41-50']
runs=[65,55,70,60,90]
plt.xlabel('Over Range')
plt.ylabel('Runs Scored')
plt.title('India Scoring Rate')
plt.bar(overs,runs)
plt.show( )
```



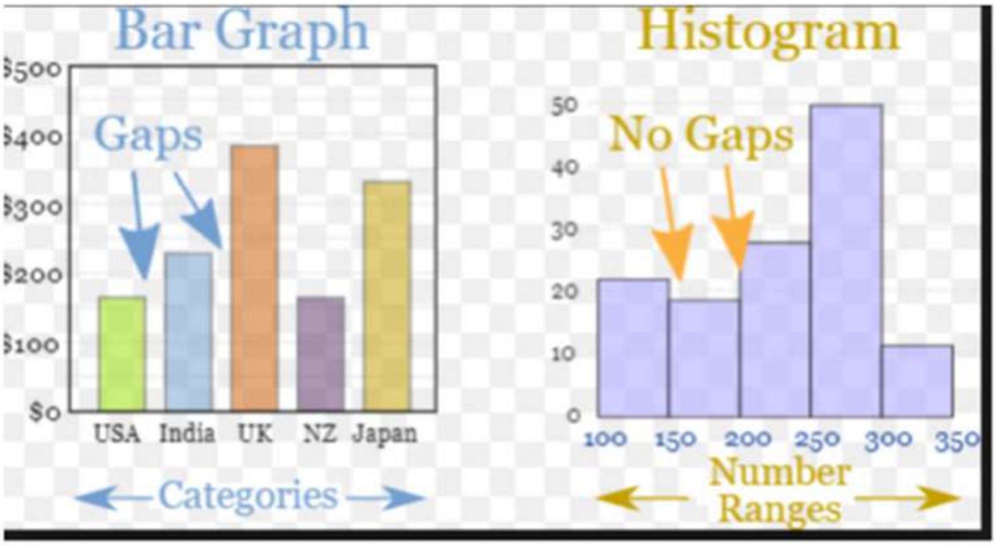
HISTOGRAM

A histogram is a graphical representation which organizes a group of data points into user specified ranges.

Histogram provides a visual interpretation of numerical data by showing the number of data points that fall within a specified range of values (“bins”). It is similar to a vertical bar graph but without gaps between the bars.

Difference between a histogram and a bar chart / graph –

A bar chart majorly represents categorical data (data that has some labels associated with it), they are usually represented using rectangular bars with lengths proportional to the values that they represent. While histograms on the other hand, is used to describe distributions.



Creating a Histogram :

- It is a type of bar plot where X-axis represents the bin ranges while Y-axis gives information about frequency.
- To create a histogram the first step is to create bin of the ranges, then distribute the whole range of the values into a series of intervals, and count the values which fall into each of the intervals.

- Bins are clearly identified as consecutive, non-overlapping intervals of variables.
- The hist() function is used to create histogram
- **Syntax:**

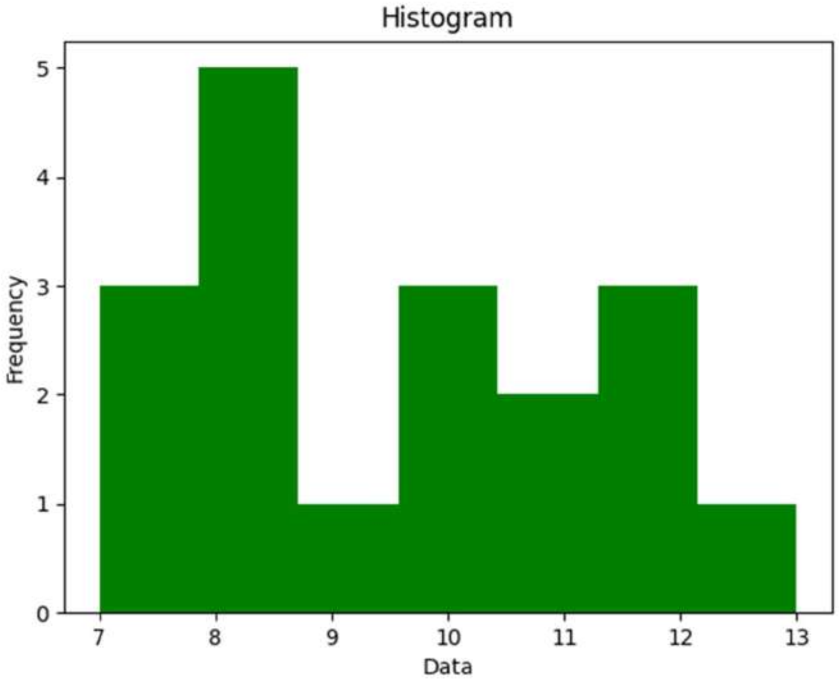
  plt.hist(x,other parameters)

Optional Parameters

x	array or sequence of array
bins	optional parameter contains integer or sequence or strings
histtype	optional parameter used to create type of histogram [bar, barstacked, step, stepfilled], default is “bar”
align	optional parameter controls the plotting of histogram [left, right, mid]
orientation	Optional. Possible values are ‘horizontal’ or ‘vertical’
color	optional parameter used to set color or sequence of color specs

PROGRAM :

```
import matplotlib.pyplot as plt

data=[7,7,7,8,8,8,8,8,9,10,10,10,11,11,12,12,12,13]

plt.xlabel('Data')

plt.ylabel('Frequency')

plt.title('Histogram')

plt.hist(data,bins=7,color='green')

plt.show()
```



- **Title**

plt.title('Histogram ') – Change it as per requirement

- **Label**-

plt.xlabel('Data') – to set the x axis label

plt.ylabel('Frequency') – to set the y axis label

- **Legend -** A legend is an area describing the elements of the graph. In the matplotlib library there is a function named legend() which is used to place a legend on the axes . When we plot multiple ranges in a single plot ,it becomes necessary that legends are specified.It is a color or mark linked to a specific data range plotted .

To plot a legend you need to do two things.

i)In the plotting function like bar() or plot() , give a specific label to the data range using label

ii)Add legend to the plot using legend ( ) as per the sytax given below .

Syntax : - plt.legend((loc=position number or string)

position number **can be** u1,2,3,4 specifying the position strings upper right/'upper left/'lower left/lower right respectively .

Default position is upper right or 1

Saving the Plot

To save any plot savefig() method is used. Plots can be saved in various formats like pdf,png,eps etc .

```
plt.savefig('line_plot.pdf')  // save plot in the current directory
plt.savefig('d:\\plot\\line_plot.pdf')   // save plot in the given path
```

WORKSHEET 1

1.What is data visualization?

a) It is the numerical representation of information and data

b) It is the graphical representation of information and data

c) It is the character representation of information and data

d) None of the above

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

a) matplotlib.pyplot

b) matplotlib.pip

c) matplotlib.numpy

d) mathplotlib.pyplot

3.The command used to give a heading to a graph is _________

(a) plt.show()

(b) plt.plot()

(c) plt.xlabel()

(d) plt.title()

4. Using Python Matplotlib _________ can be used to count how many values fall into each interval.

(a) line plot

(b) bar graph

(c) histogram

(d) None of these

5.Fill the missing statement

```
import matplotlib.pyplot as plt
 marks=[30,10,55,70,50,25,75,49,28,81]
 plt._____(marks, bins='auto', color='green')
plt.show()
```

(a) plot

(b) bar

(c)hist

(d)draw

6.Which module of matplotlib library is required for plotting of graph ?

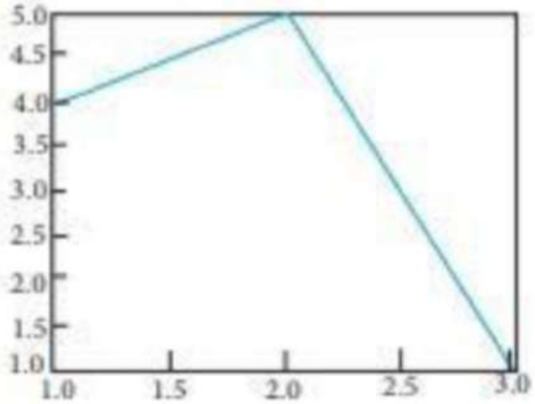
(a) Plot

(b) Matplot

(c) pyplot

(d) graphics

7.Observe the output figure. Identify the code for obtaining this output.



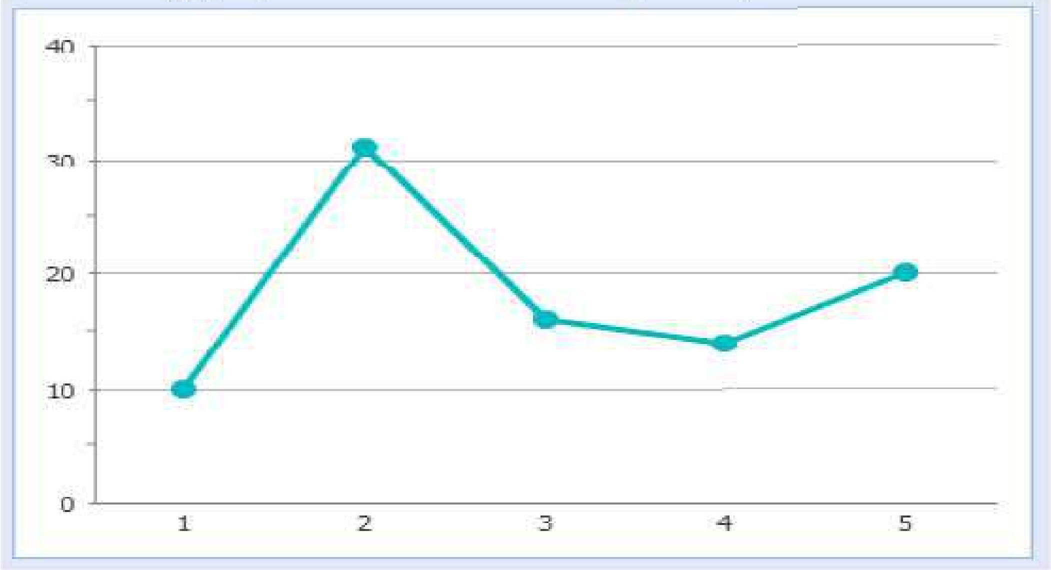
a)
```
import matplotlib.pyplot as plt
plt.plot([1,2],[4,5])
plt.show()
```
b)
```
import matplotlib.pyplot as plt
plt.plot([2,3],[5,1])
plt.show()
```
c)
```
import matplotlib.pyplot as plt
plt.plot([1,2,3],[4,5,1])
plt.show()
```
d)
```
import matplotlib.pyplot as plt
```

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

8.Identify the right type of chart using the following hints.
Hint 1: This chart is often used to visualize a trend in data over intervals of time.
Hint 2: The line in this type of chart is often drawn chronologically.
a) Line chart
b) Bar chart
c) Pie chart
d) Scatter plot

9.Which of the following is/are correct statement for plot method?
a) plt.plot(x,y,color,others)
b) pl.plot(x,y)
c) pl.plot(x,y,color)
d) All the above

10. Consider the following graph. Write the code to plot it



ANSWERS

1. **b) It is the graphical representation of information and data**
2. **a) matplotlib.pyplot**
3. **d) plt.title()**
4. **c) histogram**
5. **c)hist**
6. **c) pyplot**
7. **c) import matplotlib.pyplot as plt**
   plt.plot([1,2,3],[4,5,1])
   plt.show()

8. **a) Line chart**
9. **d) All the above**
10. **import matplotlib.pyplot as plt**

```
a = [1,2,3,4,5]
b = [10,31,26,24,20]
plt.plot(a,b)
plt.show()
```

WORKSHEET 2

1.To give a title to x-axis, which of the following method is used?
a) plt.xtitle(“title”)
b) plt.xlabel(“title”)
c) plt.xheader(“title”)
d) plt.xlabel.show(“title”)

2.To change the width of bars in bar chart, which of the following argument with a float value is used?
a) thick
b) thickness
c) width
d) barwidth

3.What is the purpose of legend?
a) A legend is an area describing the elements of the graph.
b) A legend is top area with information about graph
c) A legend is additional information of x and y labels
d) A legend is a mini box with bars data

4.Which function can be used to export generated graph in matplotlib to png
1. a) savefigure ( )
2. b) savefig( )
3. c) save( )
4. d) export ( )

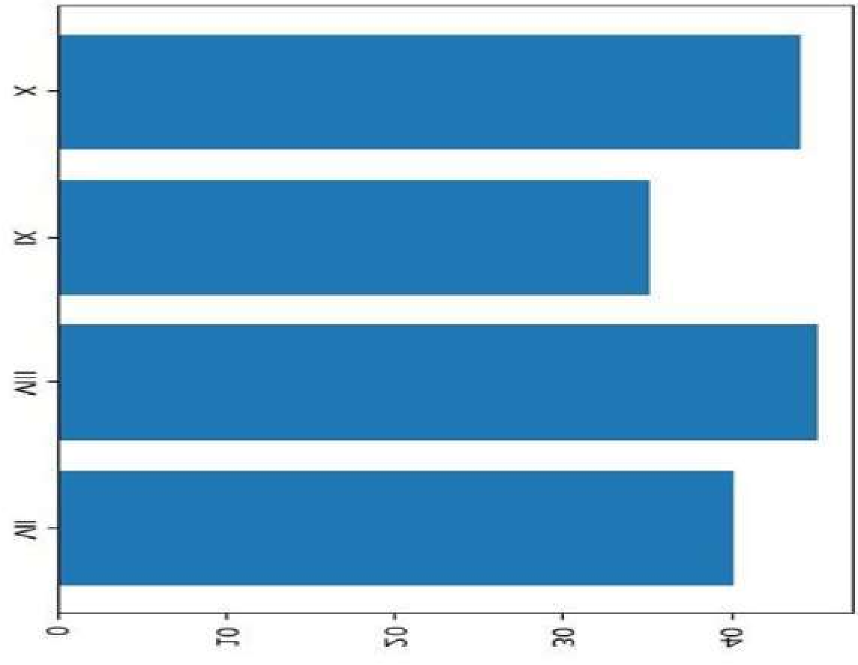
5.which one of these is not a valid line style in matplotlib
a) ‘-‘
b) ‘--‘
c) ‘-.’
d) ‘<’

6.How can we make bar chart horizontal?
a) plt.bar()
b) plt.hbar()
c) plt.barh()
d) plt.rightbar()

7. A histogram is used:
a) for continuous data
b) for grouped data
c) for time series data
d) to compare two sets of data
8.Which function is used to show legend ?
a) display ( )
b) show( )
c) legend( )
d) legends( )

9.The datapoints plotted on a graph are called ______________
a) Markers
b) Values
c) Ticks
d) Pointers

10.Write code to draw the following bar graph representing the classes and number of students in each class.



Answers:

1. **b) plt.xlabel("title")**
2. **c) width**
3. **a) A legend is an area describing the elements of the graph.**
4. **b) savefig( )**
5. **d) '<'**
6. **c) plt.barh()**
7. **a) for continuous data**
8. **c) legend( )**
9. **a)Markers**
10.

```
import matplotlib.pyplot as plt
classes = ['VII','VIII','IX','X']
students = [40,45,35,44]
plt.barh(classes, students)
plt.show()
```

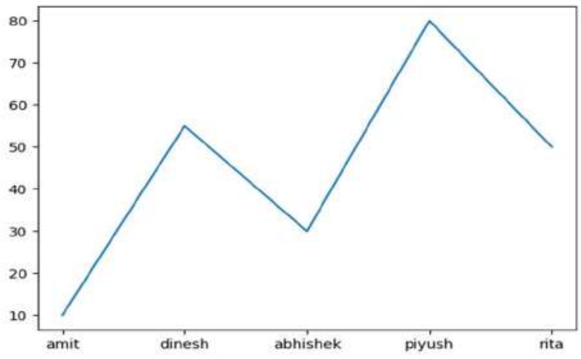
WORKSHEET 3

1.To specify the style of line as dashed , which argument of plot() needs to be set ?

a) line
b) width
c) Style
d) linestyle

2. Which of the following is not a valid plotting function in pyplot?
   a) bar()
   b) hist()
   c) histh()
   d) barh()

3.Observe the following figure. Identify the coding for obtaining this as output.



   a) import matplotlib.pyplot as plt

```
eng_marks=[10,55,30,80,50]
st_name=["amit","dinesh","abhishek","piyush","rita"]
plt.plot(st_name,eng_marks)
plt.show()
```

b)
```
import matplotlib.pyplot as plt
eng_marks=[10,55,30,80,50]
st_name=["amit","dinesh","abhishek","piyush","rita"]
plt.plot(st_name,eng_marks)
```

c)
```
import matplotlib.pyplot as plt
eng_marks=[10,55,30,80,50]
st_name=["amit","dinesh","abhishek","piyush","rita"]
plt.plot(eng_marks, st_name)
plt.show()
```

d)
```
import matplotlib.pyplot as plt
eng_marks=[10,55,30,80,50]
st_name=["amit","dinesh","abhishek","piyush","rita"]
plt.plot(eng_marks, st_name)
plt.show()
```

4.Read the statements given below and identify the right option to draw a histogram.

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

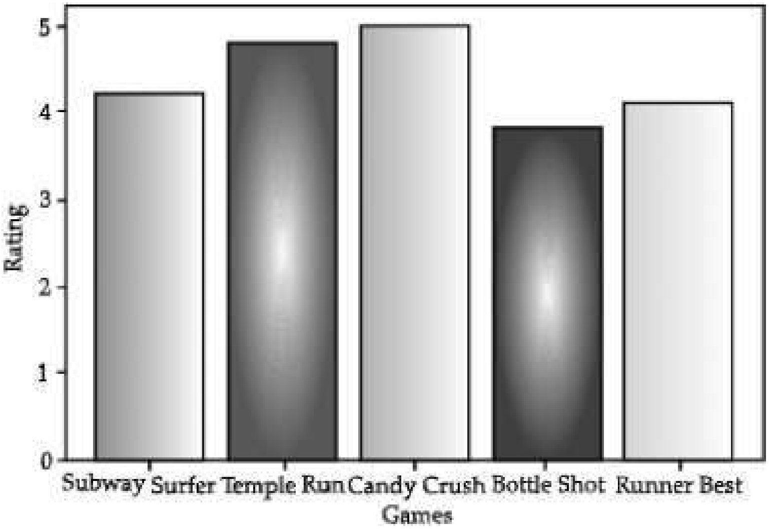
Statement B: The bin parameter is compulsory to create histogram.

a) Statement A is correct
b) Statement B is correct
c) Statement A is correct, but Statement B is incorrect
d) d. Statement A is incorrect, but Statement B is correct

5. 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

Go through the following case study and answer the questions 6 to 10.

Mr. Sharma is working in a game development industry and he was comparing the given chart on the basis of the rating of the various games available on the play store. He is trying to write a code to plot the graph. Help Mr. Sharma to fill in the blanks of the code and get the desired output.



import_________________________ #Statement 1

Games=[“Subway Surfer”,”Temple Run”,”Candy Crush”,”Bottle hot”,”Runner Best”]

Rating=[4.2,4.8,5.0,3.8,4.1]

plt._____________(Games,Rating) #Statement 2

plt.xlabel(“Games”)

plt._____________(“Rating”) #Statement 3

plt.______________ #Statement 4

6) Choose the right code from the following for statement 1.

(a) matplotlib as plt

(b) pyplot as plt

(c) matplotlib.pyplot as plt

(d) matplotlib.plt as pyplot

7) Identify the name of the function that should be used in statement 2 to plot the above graph.

(a) line()

(b) bar()

(c) hist()

d) barh()

8) Choose the correct option for the statement 3.

(a) title(“Rating”)

(b) ytitle(“Rating”)

(c) ylabel(“Rating”)

(d) yaxis(“Rating”)

9) Choose the right function/method from the following for the statement 4.

(a) display()

(b) print()

(c) bar()

(d) show()

10) In case Mr. Sharma wants to change the above plot to any other shape, which statement, should he change.

(a) Statement 1

(b) Statement 2

(c) Statement 3

(d) Statement 4

11.Write a program to generate a histogram with the following values

X=[25,28,35,46,57,68,73]

Include the following parameters/arguments along with historam

1.It should be a horizontal histogram
2.Number of bins should be 20

ANSWERS

1. d) linestyle
2. c)histh( )

3.
```
import matplotlib.pyplot as plt
eng_marks=[10,55,30,80,50]
st_name=["amit","dinesh","abhishek","piyush","rita"]
plt.plot(st_name,eng_marks)
plt.show()
```
4. c) Statement A is correct, but Statement B is incorrect
5. d). histogram
6. c) matplotlib.pyplot as plt
7. b) bar()
8. c) ylabel(“Rating”)
9. d) show()
10. b) Statement 2
11.

```
import matplotlib.pyplot as plt
X=[25,28,35,46,57,68,73]
plt.hist(X,orientation='horizontal',bins=20)
plt.show()
```

Index

UNIT 2

Database Query and SQL Math Functions

- **POW( ) or POWER( )**

POWER(A, B) or POW(A, B) returns the number A raised to the power of another number B.Here the number A is the base and the number B is the exponent. Needs two numbers as parameters.

SYNTAX: SELECT POW(A, B);

Examples:

1) mysql> select power(2,3);
```
+..................+
| power(2,3) |
+.................+
|        8       |
+.................+
1 row in set (0.05 sec)
```
2) mysql>select pow(2,3);
```
+...............+
| pow(2,3)  |
+...............+
|      8      |
+...............+
1 row in set (0.00 sec)
```
3) mysql>select pow(2.0 , 3.0);
```
+....-..........-+
| pow(2.0,3.0) |
+....-..........-+
|          8        |
+....-..........-+
1 row in set (0.00 sec)
```

- **ROUND( )**

  This function is used to round the number to the specified number of decimal places. Parameters required: the number to be rounded and the number of decimal places required.

If the number of decimal places required is not mentioned, then the result will not have decimal places

SYNTAX: SELECT ROUND(NUMBER, NUMBER OF DECIMAL PLACES)

Examples :

1) mysql>select round(2.25);
```
+....-..........+
| round(2.25) |
+..................+
|         2        |
+..................+
1 row in set (0.01 sec)
```

```
2)  mysql>select round(2.25, 1);
    +----------------+
    | round(2.25, 1) |
    +----------------+
    |      2.3       |
    +----------------+
    1 row in set (0.00 sec)
3)  mysql>select round(2.25, 2);
    +----------------+
    | round(2.25, 2) |
    +----------------+
    |      2.25      |
    +----------------+
    1 row in set (0.00 sec)
4)  mysql>select round (2.26, 0);
    +----------------+
    | round(2.26, 0) |
    +----------------+
    |       2        |
    +----------------+
    1 row in set (0.00 sec)
5)  mysql>select round(135.43, 0);
    +------------------+
    | round(135.43, 0) |
    +------------------+
    |       135        |
    +------------------+
6)  mysql>select round(135.53, 0);
    +------------------+
    | round(135.53, 0) |
    +------------------+
    |       136        |
    +------------------+
    1 row in set (0.00 sec)
7)  mysql>select round(135.55, 1);
    +------------------+
    | round(135.55, 1) |
    +------------------+
    |      135.6       |
    +------------------+
    1 row in set (0.00 sec)

8)  mysql>select round(135.55, -1);
    +-------------------+
    | round(135.55, -1) |
    +-------------------+
    |        140        |
      +-----------------+
      1 row in set (0.00 sec)
9)    mysql>select round(134.45, -1);
      +------------------+
      | round(134.45, -1)  |
      +-----------------+
      |          130        |
      +-----------------+
      1 row in set (0.00 sec)
10)mysql>select round(134.45, -2);
      +------------------+
      | round(134.45, -2)  |
      +-----------------+
      |          100        |
      +-----------------+
      1 row in set (0.00 sec)
11)mysql>select round(154.45, -2);
      +------------------+
      | round(154.45, -2)   |
      +-----------------+
      |          200        |
      +-----------------+
      1 row in set (0.00 sec)

12)mysql>select round(1454.45, -2);
      +------------------+
      | round(1454.45, -2) |
      +------------------+
      |          1500       |
      +------------------+
      1 row in set (0.00
      sec)
13)mysql>select round(1444.45, -2);
      +-------------------+
      | round(1444.45, -2) |
      +------------------+
      |          1400       |
      +

      ------------------
      +
      1 row in set (0.00
      sec)
14)mysql>select round(1444.45, -3);
      +-------------------+
      | round(1444.45, -3)  |
      +-------------------+
      |          1000         |
      +------------------+ 1 row in set (0.00 sec)
```

15) mysql>select round(1544.45, -3);

```
+-------------------+
| round(1544.45, -3) |
+-------------------+
|         2000       |
+-------------------+
1 row in set (0.00 sec)
```

- **MOD( )**

  This function can be used to find modulus (remainder) when one number is divided by another.

Examples:

mysql>select mod(5,3)

```
+----------+
| mod(5,3)  |
+----------+
|     2     |
+----------+
1 row in set (0.00 sec)
```

1) mysql> select mod(5,4);

```
+----------+
| mod(5,4)   |
+----------+
|     1      |
+----------+
1 row in set (0.00 sec)
```

2) mysql>select mod(4,2);

```
+--------- -+
| mod(4,2) |
+----------+
|     0     |
+--------+
1 row in set (0.00 sec)
```

Text/String/Character Functions:

- **UCASE( ) / UPPER( )**

Used to convert a character or text to uppercase.

Examples:

1) mysql>SELECT UCASE('hello');

```
+-------------------+
| UCASE('hello') |
+-------------------+
| HELLO              |
+-------------+
1 row in set (0.00 sec)
```

2) `mysql>SELECT Upper('hello');`

```
+----------------+
| Upper('hello') |
+----------------+
| HELLO          |
+----------------+
1 row in set (0.00 sec)
```

- **LCASE( ) / LOWER( ) :**

Used to convert a character or text to lowercase.

Examples:

1) `mysql>select lcase('HELLO');`

```
+-----------------+
| lcase('HELLO') |
+-----------------+
| hello           |
+-----------------+
1 row in set (0.00 sec)
```

2) `mysql>select LOWER('HELLO');`

```
+--------------------+
| LOWER('HELLO') |
+--------------------+
| hello              |
+--------------------+
1 row in set (0.00 sec)
```

- **MID( ) :** To extract a specified number of characters from the string. First parameter is the text/string. Second parameter is the starting index and the thirdparameter is the number of characters required. (Note: index starts with 1 and not 0.)

Examples:

1) `mysql>SELECT MID('ABCDEFGHIJKLMNOP', 1,4);`

```
+-----------------------------+
| MID('ABCDEFGHIJKLMNOP', 1,4) |
+-----------------------------+
| ABCD                         |
1 row in set (0.00
sec)
```

2) `mysql>SELECT MID('ABCDEFGHIJKLMNOP', 1);`

```
+------------------------------------+
| MID('ABCDEFGHIJKLMNOP', 1) |
+------------------------------------+
| ABCDEFGHIJKLMNOP           |
+1 row in set (0.00 sec)
```

```
3)  mysql> SELECT MID('ABCDEFGHIJKLMNOP', -2,-1);
    +---------------------------------+
    | MID('ABCDEFGHIJKLMNOP', -2,-1) |
    +---------------------------------+
    |                                 |
    +1 row in set (0.00
    sec)
4)  mysql>SELECT MID('ABCDEFGHIJKLMNOP', 0,4);
    +-------------------------------+
    | MID('ABCDEFGHIJKLMNOP', 0,4) |
    +-------------------------------+
    |                               |
    1 row in set (0.00
    sec)
```

(Please note the output of example 3, 4)

```
5)  mysql>SELECT MID('ABCDEFGHIJKLMNOP', 3,4);
    +---------------------------------------------+
    | MID('ABCDEFGHIJKLMNOP', 3,4) |
    +----------------------------------------------+
    | CDEF                                         |
    +1 row in set (0.00 sec)
6)  mysql>SELECT MID('ABCDEFGHIJKLMNOP', -4,2);
    +-----------------------------------------------+
    | MID('ABCDEFGHIJKLMNOP', -4,2) |
    +-----------------------------------------------+
    | MN                                            |
    +-----------------------------------------------+1 row in set (0.00 sec)
```

- **SUBSTRING( )** : Same as MID( ) function

To extract a specified number of characters from thestring.

Examples:

```
1)  mysql>SELECT SUBSTRING('ABCDEFGHIJKLMNOP', 3,4);
    +---------------------------------------------------------+
    | SUBSTRING('ABCDEFGHIJKLMNOP', 3,4) |
    +--------------------------------------------------------+
    | CDEF                                                    |
    +1 row in set (0.00 sec)

2)  mysql>SELECT SUBSTRING('ABCDEFGHIJKLMNOP', 0,4);
    +--------------------------------------------------------+
    | SUBSTRING('ABCDEFGHIJKLMNOP', 0,4) |
    +--------------------------------------------------------+
    |                                                        |
    +1 row in set (0.00 sec)
```

```
3) mysql>SELECT SUBSTRING('ABCDEFGHIJKLMNOP', 1,4);
   +--------------------------------------+
   | SUBSTRING('ABCDEFGHIJKLMNOP', 1,4) |
   +--------------------------------------+
   | ABCD                                 |
   +1 row in set (0.00 sec)
4) mysql>SELECT SUBSTRING('ABCDEFGHIJKLMNOP', 4,2);
   +--------------------------------------+
   | SUBSTRING('ABCDEFGHIJKLMNOP', 4,2) |
   +--------------------------------------+
   | DE                                    |
   +1 row in set (0.00 sec)
5) mysql>SELECT SUBSTRING('ABCDEFGHIJKLMNOP', -4,2);
   +---------------------------------------+
   | SUBSTRING('ABCDEFGHIJKLMNOP', -4,2) |
   +---------------------------------------+
   | MN                                    |
   +1 row in set (0.00 sec)
```

- **SUBSTR( ) :** Same as that of MID( ) and SUBSTRING( )

Examples:

```
1) mysql>SELECT SUBSTR('ABCDEFGHIJKLMNOP', -4,3);
   +-----------------------------------+
   | SUBSTR('ABCDEFGHIJKLMNOP', -4,3) |
   +-----------------------------------+
   | MNO                               |
   +1 row in set (0.00 sec)
2) mysql>SELECT SUBSTR('ABCDEFGHIJKLMNOP', 1,3);
   +-----------------------------------+
   | SUBSTR('ABCDEFGHIJKLMNOP', 1,3) |
   +-----------------------------------+
   | ABC                               |
   +1 row in set (0.00 sec)
3) mysql>SELECT SUBSTR('ABCDEFGHIJKLMNOP', 4,3);
   +-----------------------------------+
   | SUBSTR('ABCDEFGHIJKLMNOP', 4,3) |
   +-----------------------------------+
   | DEF                               |
   ----------------------------------+1 row in set (0.00 sec)
```

- **LENGTH( ) :**

This function returns the number of characters in the given text.

Examples:

```
1) mysql> SELECT LENGTH('HELLO WORLD');
   +-------------------------+
   | LENGTH('HELLO WORLD') |
   +-------------------------+
   |           11            |
+1 row in set (0.00 sec)
```

2)
```
mysql> SELECT LENGTH('  ');
+...................+
| LENGTH('   ') |
+...................+
|          3        |
+1 row in set (0.00 sec)
```

3)
```
mysql> SELECT LENGTH(' ');
+.......................+
| LENGTH('    ') |
+.......................+
|         1           |
+........................+
1 row in set (0.00 sec)
```

- **LEFT( ) :**Returns the specified number of characters including space starting from the leftmost characters.
  Parameters required : text, number of characters to be extracted.
  Examples:

1)
```
mysql>SELECT LEFT('ABCDEFGHIJKLMNOP',1);
+..............................................+
| LEFT('ABCDEFGHIJKLMNOP',1) |
+...............................................+
| A                                             |
+1 row in set (0.00 sec)
```

2)
```
mysql> SELECT LEFT('ABCDEFGHIJKLMNOP',2);
+..............................................+
| LEFT('ABCDEFGHIJKLMNOP',2) |
+.............................................+
| AB                                          |
+1 row in set (0.00 sec)
```

3)
```
mysql> SELECT LEFT('ABCDEFGHIJKLMNOP',3);
+.............................................+
| LEFT('ABCDEFGHIJKLMNOP',3) |
+.............................................+
| ABC                                         |
+1 row in set (0.00 sec)
```

4)
```
mysql> SELECT LEFT('ABCDEFGHIJKLMNOP',-1);
+...............................................+
| LEFT('ABCDEFGHIJKLMNOP',-1) |
+..............................................+
+1 row in set (0.00 sec)
```

(**Note** : In the above example , the number of characters to be selected is -1 and hence characters are notextracted)

- **RIGHT( ) :**Returns the specified number of characters including space starting from the right of the text.
  Parameters required : text, number of characters to be extracted.
  Examples:

1)
```
mysql> SELECT RIGHT('ABCDEFGHIJKLMNOP',1);
+.................................................+
| RIGHT('ABCDEFGHIJKLMNOP',1) |
+.................................................+
| P                               |
+1 row in set (0.00 sec)
```
(Extracting 1 character)

2)
```
mysql> SELECT RIGHT('ABCDEFGHIJKLMNOP',2);
+................................................+
| RIGHT('ABCDEFGHIJKLMNOP',2) |
+................................................+
| OP                              |
+1 row in set (0.00 sec)
```
(Extracting 2 characters)

3)
```
mysql> SELECT RIGHT('ABCDEFGHIJKLMNOP',3);
+.................................................+
| RIGHT('ABCDEFGHIJKLMNOP',3) |
+................................................+
| NOP                              |
+1 row in set (0.00 sec)
```

4)
```
mysql> SELECT RIGHT('ABCDEFGHIJKLMNOP',4);
+.................................................+
| RIGHT('ABCDEFGHIJKLMNOP',4) |
+................................................+
| MNOP                             |
+1 row in set (0.00 sec)
```

5)
```
mysql> SELECT RIGHT('ABCDEFGHIJKLMNOP',-1);
+..................................................+
| RIGHT('ABCDEFGHIJKLMNOP',-1) |
+.................................................+
```

- **INSTR( ) :** Checks whether the second string/text is present in the first string. If present itreturns the starting index.Otherwise returns 0.
  Examples:

1)
```
mysql> SELECT INSTR('ABCDEFGHIJKLMNOP','ABC');
+.......................................................+
| INSTR('ABCDEFGHIJKLMNOP','ABC') |
+.......................................................+
|                  1                 |
+1 row in set (0.00 sec)
```

```
2)  mysql> SELECT INSTR('ABCDEFGHIJKLMNOP','BC');
    +.................................+
    | INSTR('ABCDEFGHIJKLMNOP','BC') |
    +.................................+
    |               2                 |
    +1 row in set (0.00 sec)
3)  mysql> SELECT INSTR('ABCDEFGHIJKLMNOP','EFG');
    +..................................+
    | INSTR('ABCDEFGHIJKLMNOP','EFG') |
    +..................................+
    |               5                  |
    +1 row in set (0.00 sec)
4)  mysql> SELECT INSTR('ABCDEFGHIJKLMNOP','QRST');
    +...................................+
    | INSTR('ABCDEFGHIJKLMNOP','QRST') |
    +...................................+
    |               0                   |
    +1 row in set (0.00 sec)
```

- **LTRIM( ) :**To trim the spaces, if any, from the beginning of the text.
  Examples:

```
1)  mysql> SELECT LTRIM('  HELLO');
    +................+
    | LTRIM('   HELLO') |
    +................+
    | HELLO          |
    +..................
```

- **RTRIM( ) :** To trim the spaces, if any, from the end of the text.
  Examples:

```
1)  mysql> SELECT RTRIM('HELLO');
    +.................+
    | RTRIM('HELLO  ') |
    +.................+
    | HELLO           |
    +1 row in set (0.00 sec)

2)  mysql> SELECT CONCAT(RTRIM('HELLO'), 'WORLD');
    +......................................+
    | CONCAT(RTRIM('HELLO  '), 'WORLD') |
    +......................................+
    | HELLOWORLD                           |
    +......................................+
    1 row in set (0.00 sec)
```

- **TRIM( ):** To trim the spaces, if any, from the beginning and end of the text.
  Examples:

1)
```
mysql> SELECT CONCAT(TRIM('HELLO'), 'WORLD');
+--------------------------------------------------+
| CONCAT(TRIM('HELLO  '), 'WORLD')                 |
+--------------------------------------------------+
| HELLOWORLD                                       |
+--------------------------------------------------+1 row in set (0.00 sec)
```

Note: CONCAT( ) combines two strings/texts

2)
```
mysql> SELECT TRIM('   HELLO ');
+--------------------+
| TRIM('   HELLO   ') |
+--------------------+
| HELLO              |
+---------------------+
1 row in set (0.00 sec)
```

Try yourself:

Give the output of the following:

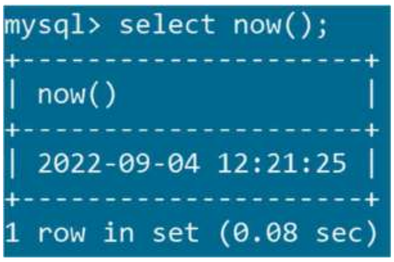
1. SELECT POWER(3,3);
2. SELECT POW(3,2);
3. SELECT ROUND(123.45,1);
4. SELECT ROUND(123.45,-1);
5. SELECT ROUND(123.45,0);
6. SELECT ROUND(153.45,2);
7. SELECT ROUND(155.45,0);
8. SELECT ROUND(245,-2);
9. SELECT ROUND(255,- 2);
10. SELECT ROUND(897,3);
11. SELECT ROUND(457,-3);
12. SELECT ROUND(1567,-3);
13. SELECT RIGHT(‘MORNING’, 2);
14. SELECT MID(TRIM(‘GOOD ‘) , 1, 4);
15. SELECT INSTR(‘GOOD MORNING’ , ‘GOOD’);

Answers

1) 27, 2)9, 3)123.5 4)120, 5)123 6)200, 7)155, 8)200, 9)300, 10)1000, 11)0, 12)2000, 13)NG , 14)GOOD, 15)1

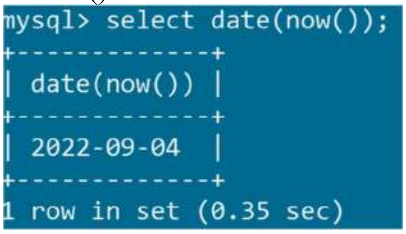
Date Functions

1 NOW():- Function that returns the current date and time.



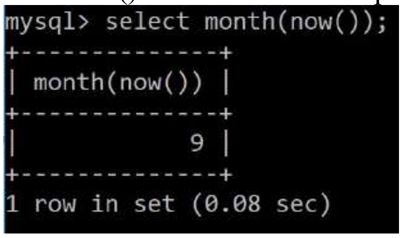
```
mysql> select now();
+---------------------+
| now()               |
+---------------------+
| 2022-09-04 12:21:25 |
+---------------------+
1 row in set (0.08 sec)
```

2 DATE():- This function returns the date part from Date and time.



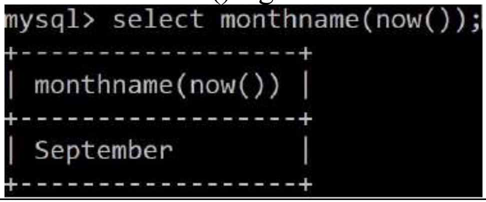
```
mysql> select date(now());
+-------------+
| date(now()) |
+-------------+
| 2022-09-04  |
+-------------+
1 row in set (0.35 sec)
```

3 MONTH() returns the month part of a date.



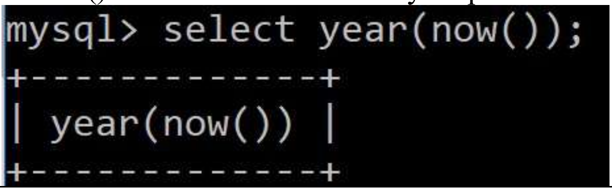
```
mysql> select month(now());
+--------------+
| month(now()) |
+--------------+
|            9 |
+--------------+
1 row in set (0.08 sec)
```

4 MONTHNAME() :-gives month name from a date.



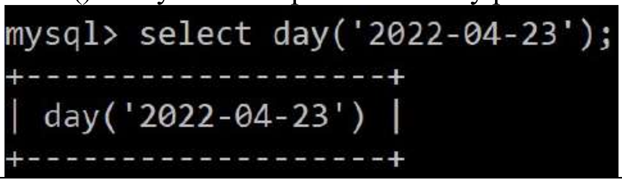
```
mysql> select monthname(now());
+------------------+
| monthname(now()) |
+------------------+
| September        |
+------------------+
```

5 YEAR():- Date function returns year part of a date.



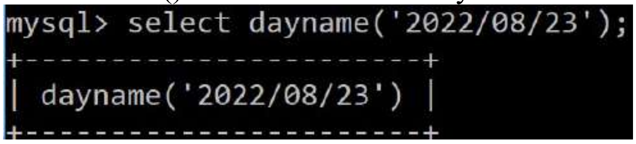
```
mysql> select year(now());
+-------------+
| year(now()) |
+-------------+
```

6 DAY():- Day function provide the day part of Date.



```
mysql> select day('2022-04-23');
+-------------------+
| day('2022-04-23') |
+-------------------+
```

7 DAYNAME():- Returns the weekday name of a date.



```
mysql> select dayname('2022/08/23');
+-----------------------+
| dayname('2022/08/23') |
+-----------------------+
```

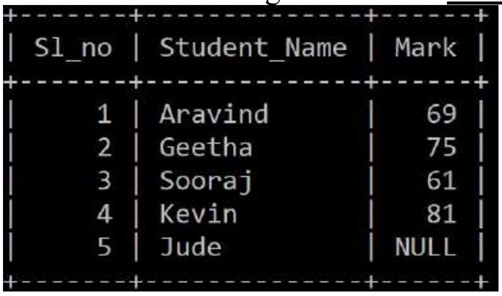
Aggregate functions:- It perform calculation on multiple values and return a single value. It is also know as Multi-row functions

List of aggregate functions

MAX(),MIN(),AVG(),SUM(),COUNT()

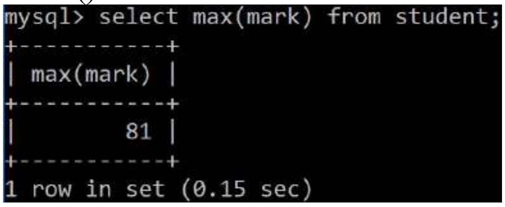
Aggregate function will not consider NULL values for calculation.

Conside the following table named **student.**



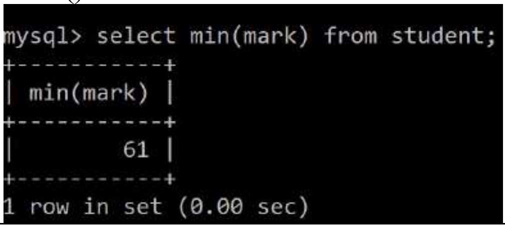
```
+-------+--------------+------+
| Sl_no | Student_Name | Mark |
+-------+--------------+------+
|     1 | Aravind      |   69 |
|     2 | Geetha       |   75 |
|     3 | Sooraj       |   61 |
|     4 | Kevin        |   81 |
|     5 | Jude         | NULL |
+-------+--------------+------+
```

1 MAX():- returns maximum value from a dataset.



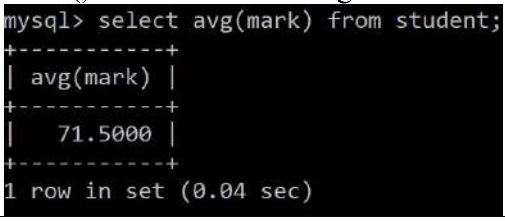
```
mysql> select max(mark) from student;
+-----------+
| max(mark) |
+-----------+
|        81 |
+-----------+
1 row in set (0.15 sec)
```

2 MIN():- Returns the minimum value from a dataset.



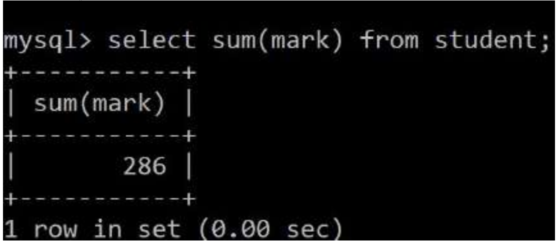
```
mysql> select min(mark) from student;
+-----------+
| min(mark) |
+-----------+
|        61 |
+-----------+
1 row in set (0.00 sec)
```

3 AVG():- Returns the average value from a dataset.



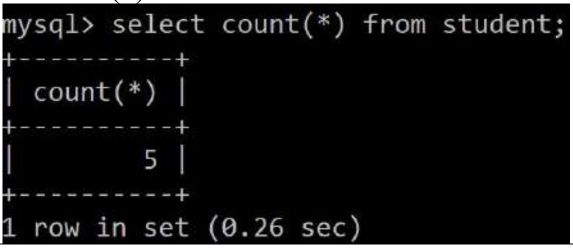
```
mysql> select avg(mark) from student;
+-----------+
| avg(mark) |
+-----------+
|   71.5000 |
+-----------+
1 row in set (0.04 sec)
```

4 SUM():- It returns the sum of values in a dataset.



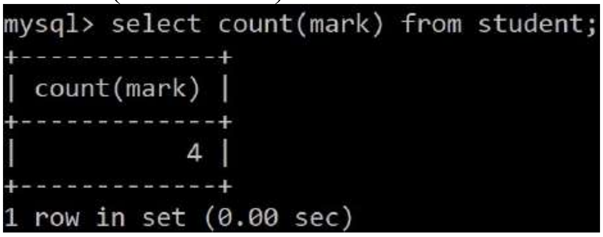
```
mysql> select sum(mark) from student;
+-----------+
| sum(mark) |
+-----------+
|       286 |
+-----------+
1 row in set (0.00 sec)
```

5 COUNT(*):-Will return the total number of rows present in the Table.



```
mysql> select count(*) from student;
+----------+
| count(*) |
+----------+
|        5 |
+----------+
1 row in set (0.26 sec)
```

6 COUNT(Field Name) will count the number of values(excluding NULL) present in the dataset.

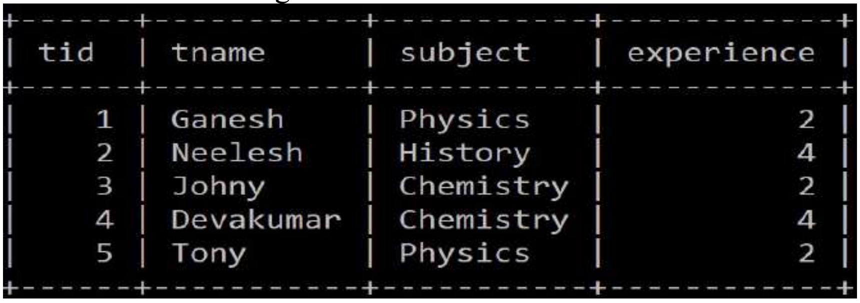


```
mysql> select count(mark) from student;
+-------------+
| count(mark) |
+-------------+
|           4 |
+-------------+
1 row in set (0.00 sec)
```

Here answer 4 is displyed even though 5 rows are present in the student table because one NULL value is present in the column named mark.

Group By clause:- The GROUP BY statement **groups rows that have the same values into summary rows.** The GROUP BY statement is often used with aggregate functions (COUNT() , MAX() , MIN() , SUM() , AVG()) to group the result-set by one or more columns.

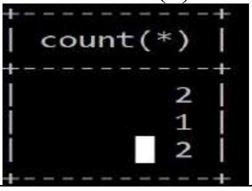
Consider the following table named **teacher**.



```
+-----+-----------+-----------+------------+
| tid | tname     | subject   | experience |
+-----+-----------+-----------+------------+
|   1 | Ganesh    | Physics   |          2 |
|   2 | Neelesh   | History   |          4 |
|   3 | Johny     | Chemistry |          2 |
|   4 | Devakumar | Chemistry |          4 |
|   5 | Tony      | Physics   |          2 |
+-----+-----------+-----------+------------+
```

1 Write SQL statement to display number of Teacher teahing **each subject**.

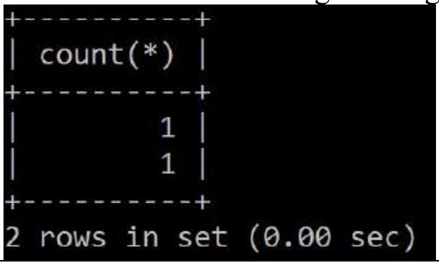
Select count(*) from teacher **group by subject**;



```
+----------+
| count(*) |
+----------+
|        2 |
|        1 |
|        2 |
+----------+
```

The WHERE clause in MySQL is used with SELECT, INSERT, UPDATE, and DELETE queries to filter rows from the table or relation. It describes a specific condition when retrieving records from tables.

2 Display number of employees in each subject whose experience is more than 2.
select count(*) from teacher **where** experience>2 group by subject;
WHERE clause is coming before group by.



```
+----------+
| count(*) |
+----------+
|        1 |
|        1 |
+----------+
2 rows in set (0.00 sec)
```

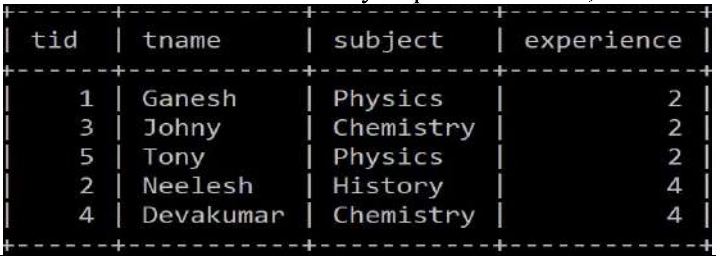
Having Clause
The HAVING clause is often used with the GROUP BY clause to filter rows based on a specified condition. If we omit the GROUP BY clause, the HAVING clause behaves like the WHERE clause.

1 Display the subject and number of teachers in each subject where group count is more than 1.
select subject, count(*) from teacher group by subject having count(*)>1;
HAVING clause is coming after group by

2 Display details of teacher whose tid more than 3
select * from teacher having tid>3;
OR
select * from teacher where tid>3;
HAVING clause is behaving like WHERE clause in this example.

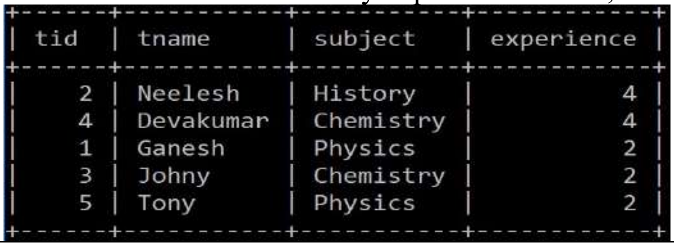
ORDER BY
Order by clause is used to arrange the rows in Ascending or Descending order of values in a Column.

1 Display the details of teachers ascending of experience.
select * from teacher order by experience;
OR
select * from teacher order by experience ASC;



```
+------+-----------+-----------+------------+
| tid  | tname     | subject   | experience |
+------+-----------+-----------+------------+
|    1 | Ganesh    | Physics   |          2 |
|    3 | Johny     | Chemistry |          2 |
|    5 | Tony      | Physics   |          2 |
|    2 | Neelesh   | History   |          4 |
|    4 | Devakumar | Chemistry |          4 |
+------+-----------+-----------+------------+
```

2 Display the teachers details in the Descending order of experience.
select * from teacher order by experience DESC;



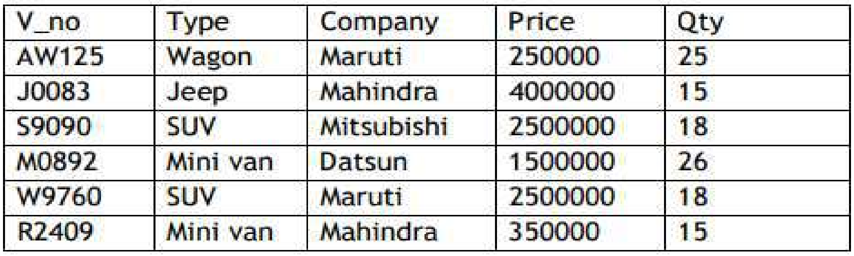
```
+------+-----------+-----------+------------+
| tid  | tname     | subject   | experience |
+------+-----------+-----------+------------+
|    2 | Neelesh   | History   |          4 |
|    4 | Devakumar | Chemistry |          4 |
|    1 | Ganesh    | Physics   |          2 |
|    3 | Johny     | Chemistry |          2 |
|    5 | Tony      | Physics   |          2 |
+------+-----------+-----------+------------+
```

Questions

1. Which of the following would arrange the rows in ascending order in SQL.
   a. SORT BY b. ALIGN BY c. GROUP BY d. ORDER BY
2. Prachi has given the following command to obtain the highest marksSelect
   max(marks) from student where group by class;
   but she is not getting the desired result. Help her by writing the correct command.
   a. Select max(marks) from student where group by class;
   b. Select class, max(marks) from student group by marks;
   c. Select class, max(marks) group by class from student;
   d. Select class, max(marks) from student group by class;

3. Help Ritesh to write the command to display the name of the youngest student?
   a. select name,min(DOB) from student ;
   b. select name,max(DOB) from student ;
   c. select name,min(DOB) from student group by name ;
   d. select name,maximum(DOB) from student;

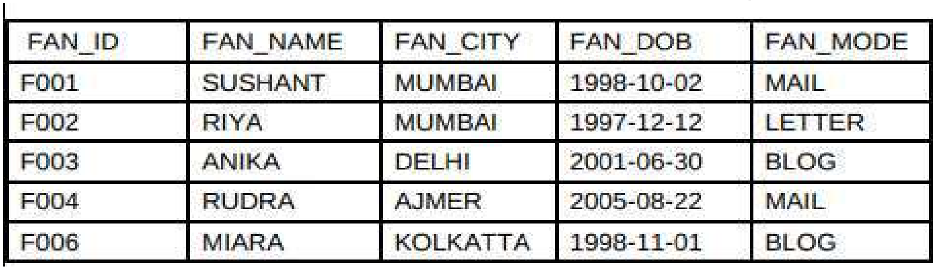
4. A relation 'Vehicles' is given below :



V_no	Type	Company	Price	Qty
AW125	Wagon	Maruti	250000	25
J0083	Jeep	Mahindra	4000000	15
S9090	SUV	Mitsubishi	2500000	18
M0892	Mini van	Datsun	1500000	26
W9760	SUV	Maruti	2500000	18
R2409	Mini van	Mahindra	350000	15

Write SQLcommands to:
a. Display the average price of each type of vehicle having quantity more than 20.
b. Count the type of vehicles manufactured by each company.
c. Display the total price of all the types of vehicles.

5. Consider the table 'FANS' and answer the following.



FAN_ID	FAN_NAME	FAN_CITY	FAN_DOB	FAN_MODE
F001	SUSHANT	MUMBAI	1998-10-02	MAIL
F002	RIYA	MUMBAI	1997-12-12	LETTER
F003	ANIKA	DELHI	2001-06-30	BLOG
F004	RUDRA	AJMER	2005-08-22	MAIL
F006	MIARA	KOLKATTA	1998-11-01	BLOG

Write MySQL queries for the following:
a. To display the details of fans in descending order of their DOB
b. To count the total number of fans of each fan mode
c. iv. To display the dob of the youngest fan.

6. Write commands in SQL for (i) and (ii) and output for (iii)

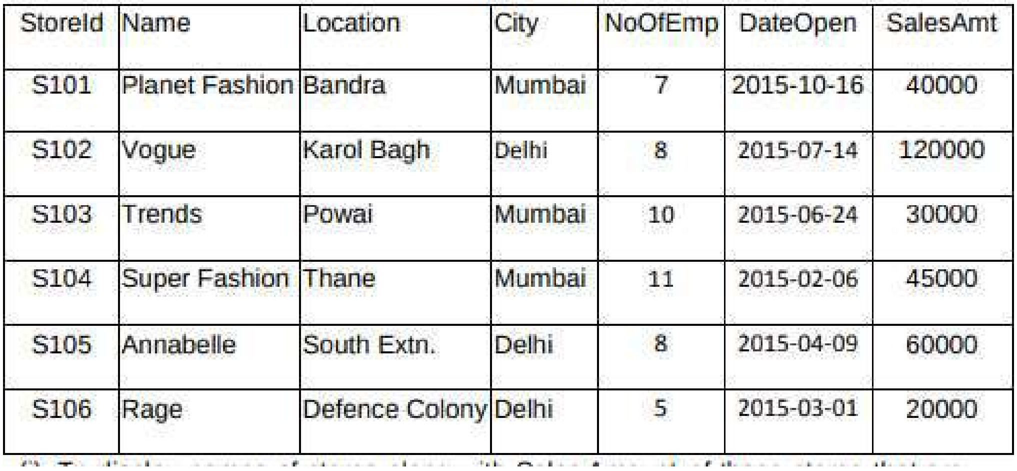


Table : Store

StoreId	Name	Location	City	NoOfEmp	DateOpen	SalesAmt
S101	Planet Fashion	Bandra	Mumbai	7	2015-10-16	40000
S102	Vogue	Karol Bagh	Delhi	8	2015-07-14	120000
S103	Trends	Powai	Mumbai	10	2015-06-24	30000
S104	Super Fashion	Thane	Mumbai	11	2015-02-06	45000
S105	Annabelle	South Extn.	Delhi	8	2015-04-09	60000
S106	Rage	Defence Colony	Delhi	5	2015-03-01	20000

(i) To display the details of the store in alphabetical order of name.

(ii) To display the City and the number of stores located in that City, only if the number of stores ismore than 2.

(iii) SELECT COUNT(STOREID), NOOFEMP FROM STORE GROUP BY NOOFEMP HAVING MAX(SALESAMT)<60000;

Answers

1. *d*
2. *d*
3. *b*

4

a. select Type, avg(Price) from Vehicle group by Type having Qty>20;

b. select Company, count(distinct Type) from Vehicle group by Company;

c. Select Type, sum(Price Qty) from Vehicle group by Type;*

5.

*i. SELECT * FROM FANS ORDER BY FAN_DOB DESC;*

ii. SELECT FAN_MODE, COUNT(*) FROM FANS GROUP BY FAN_MODE;

iii. SELECT MAX(FAN_DOB) FROM FANS;

6.

*(i) SELECT * FROM STORE ORDER BY NAME;*

(ii) SELECT CITY, COUNT(*) FROM STORE GROUP BY STORE HAVING COUNT(*)>2;

(iii)
```
Count(StoreId) | NoOfEmp |
+--------------+---------+
| 1            |  10     |
| 1            |  11     |
| 1            |   5     |
| 1            |   7     |
```

Worksheet 1

A. Give output of the following:

1. Select Round(546.345, -2);
2. Select Round(546.345, -3);
3. Select Truncate(124.56, 1);
4. Select Truncate(124.56, -2);
5. Select SIGN(-341.45);
6. Select SIGN(0);
7. Select MOD(34,5);
8. Select MOD(6,8);
9. Select MOD(12.6, 8);
10. Select Pow(2,4);
11. Select Char(78,65,77,65,78);
12. Select Char(76.5,65.3,'77.6',65,78);
13. Select Substr('JS09876/XII-H/12',-8,7);
14. Select Trim(Leading 'Pp' from 'PppProgram Features');
15. Select Instr('COORDINATION COMMITTEE ORDER','OR');
16. Select left('COORDINATION COMMITTEE ORDER', length('committee'));
17. Select right('COORDINATION COMMITTEE ORDER', length('committee order'));

B. Write MySQL statements for the following:

I. Display first letter of the provided string in CAPITAL letter and rest all in small letters.
II. Display the phone number 07762227042 in the format (07762)-22-7042.

Worksheet 2

1. select Char(70,65,67,69);
2. select Char(65, 67.3, '69.3');
3. SELECT CONCAT(NAME,dept) AS 'NAME DEPT' FROM Employee;
4. SELECT LOWER(NAME) FROM Employee
5. select substr('ABCDEFGH', 3,4);
6. select substr('ABCDEFGH', -3,4);
7. SELECT UCASE('pqrxyz');
8. SELECT RTRIM('abcdefgh ');
9. select trim('   pqr   Periodic Test 1 is over   pqr   ');
10. select instr('O P JINDAL SCHOOL, KHARSIA ROAD RAIGARH, JINDAL STEEL AND POWER LIMITED','JINDAL');
11. SELECT LENGTH('O P JINDAL SCHOOL, RAIGARH');
12. SELECT LENGTH(12345);
13. select left('JS12345/OPJS/XII/A',7);
14. select substr('JS12345/OPJS/XII/A',9,4);
15. select right('JS12345/OPJS/XII/A',5);

16. select MOD(23,5);
17. select power(3,4);
18. select ROUND(20.392,1);
19. select sign(-945);
20. select sqrt(25);
21. select truncate(129.345,1);

Worksheet 3

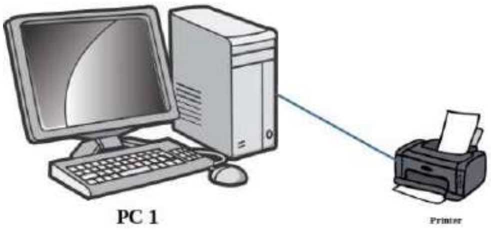
1. select pow(2,3), power(-2,3), pow(3,4);
2. select round(12345.789,2), round(1434.56,-1);
3. select round(62.789),round(6.89,0);
4. select truncate(466.789,1), truncate(645.56,-1);
5. select sqrt(81)+20 from dual;
6. select mod(23,2), mod(78,4);
7. select sign(15,-15), sign(-25), sign(70);
8. select char(65,67,69) from dual;
9. select concat(“info”,”rmatics”);
10. select concat(“ISM -”,concat(“xii”,”I”));
11. select lower(“INFORM”),lcase(“Class XII”);
12. select upper(“Class xii”),ucase(“informatics”);
13. select substring(“India is the Best”,3,2),substr(“Indian”,-2,1);
14. select length(trim(“ abcde defe “));
15. select instr(“Informatics”,”r”);
16. select length(“ab cde fge”);
17. select left(“Informatics”,4) from dual;
18. select right(“Informatics”,6);
19. select mid(“Indian School Muscat”,8,6);
20. Select curdate(), current_date();
21. Select date(now());
22. Select month(now());
23. Select year(“2012-02-21”);
24. Select dayname(now());
25. Select dayofmonth(“2011-03-23”);
26. Select dayofweek(now());
27. Select dayofyear(“2016-02-04”);
28. Select dayofyear(“2012-02-02”);
29. Select NOW(),SLEEP(3),SYSDATE();

Index

Unit 3

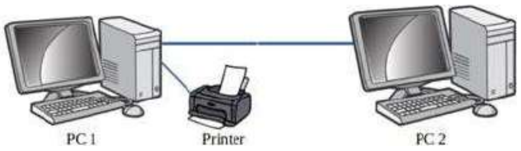
Introduction to Computer Networks

Consider a standalone computer connected to a printer.



This computer is useful for a particular person at a time. Every time we need to access the files from this PC the user needs to personally sit by it and work.

Concept of networking – Interconnection of Computers



Now we have connected PC 1 with PC 2. This is the most simple form of a computer network. The data/information in PC 1 can be accessed from PC 2 and vice-versa. Also printer can be used from both PC 1 and PC 2.

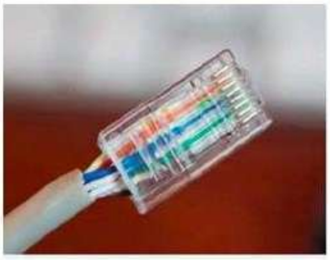
Two or more autonomous computing device connected to one another in order to exchange information or resources form a computer network.

Advantages of using computer networks

- **Resource sharing**:-Resource sharing makes it possible to use resources economically, for example, to manage peripheral devices, such as laser printers, from all connected systems.
- **Data separation** :-Data separation provides the ability to access and manage databases fromperipheral workstations that need information
- **Separation of software tools**:- The separation of software tools provides the possibility of simultaneous use of centralized, previously installed software tools.
- **CPU resource sharing**:- With the separation of processor resources, it is possible to usecomputing power for data processing by other systems that are part of the network.
- **Multiuser mode**:-The multi-user properties of the system facilitate the simultaneous use of centralized application software tools previously installed and managed, for example, if the user of the system is working with another task, then the current work performed is pushed into the background.
-

Where to connect the network cable while networking and form of cabling

The network cable is connected to a RJ-45 connector(RJ – Registered Jack



RJ 45 with network cable attached

Network port

Network cable connected to port

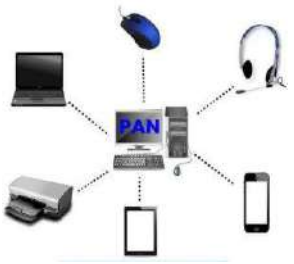
Evolution of Computer Network - Types of computer network:

There is no single system that satisfies all computer networks. For classification, specific characteristics aredistinguished that allow the networks to be divided into separate types.

The following is the different types of network based on size of computer networks:

PAN

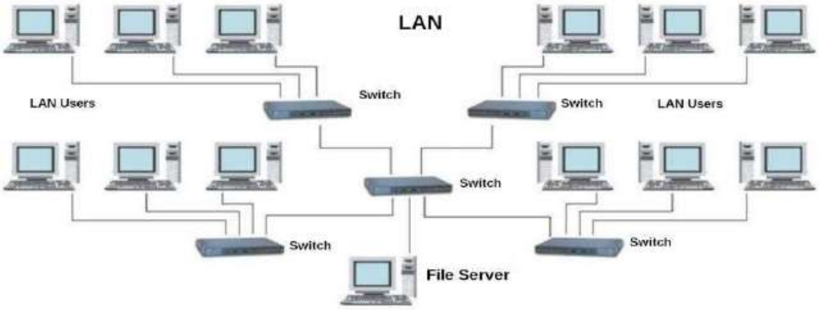
A Personal Area Network (PAN) allows devices to exchange data over short distances. PAN combines devices such as mice, keyboards, printers, smartphones, tablets, etc. The most common connection technology is Bluetooth. Bluetooth can give a range of upto 10metres.



LAN

A Local Area Network (LAN) is a computer network that, as a rule, covers a small area, located in one or morebuildings

The term "local" in this context refers to joint local management (does not mean the mandatory physical proximity of components to each other). A local network can be a home network, a combination of computers and other devices of a small office or a large enterprise



Wired connections are widely used in LAN, most of which are made using copper wires, and some are fiber—optic. Usually, wired networks operate at speeds from 100 Mbit/s to 1 Gbit/s. More modern LAN can operate at a speed of 10 Gbit/s. The most common wired connection standard is the IEEE 802.3 standard, commonly referred to asEthernet.
In local area networks, along with wired technologies, wireless connections according to the IEEE 802.11 standard,better known as **Wi-Fi**, are widely used.

Wireless Wi-Fi networks operate at speeds from several to hundreds of megabits per second.
The size of LAN networks ranges from 10metres to 1
KmMAN

Metropolitan area network(MAN) unite computers within a city. As an example, we can consider a cable television system in which it became possible to transmit digital data and, over time, the system turned into a computernetwork.

The size of MAN networks range from 1 Km to

10Km.WAN

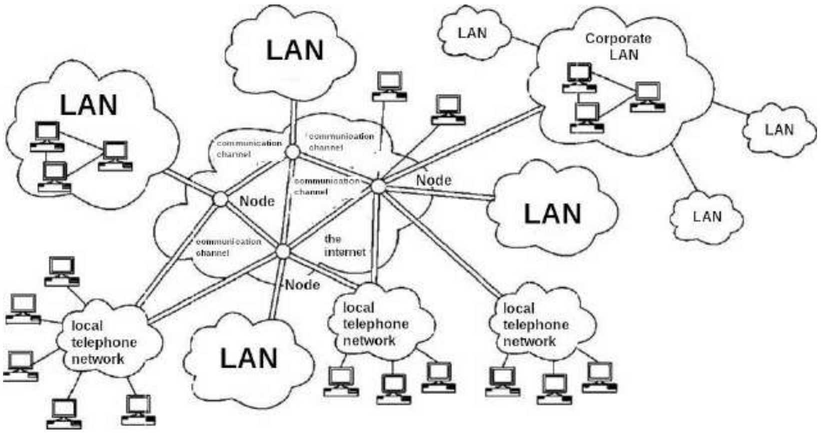
The Wide Area Network(WAN) covers significant territories, connects local networks that can be located in geographically remote areas. A global network is similar to a large wired local area network, but there are importantdifferences:

management of local networks and provision of access to the inter-network data transmission environment is carried out by various organizations;

networks using different types of network technologies can be connected;

with the help of communication channels, individual computers can communicate with local networks, or entire networks.

The Internet can be considered as a WAN. **A WAN ranges from 100km to 10000km.**


LAN
LAN
LAN
Corporate LAN
LAN
communication channel
communication channel
communication channel
communication channel
Node
Node
Node
LAN
LAN
the internet
local telephone network
local telephone network
local telephone network
LAN

Network devices

We cannot always make sure that there is a dedicated connection from one computer to another one in a computer network. Further the data travels over the telephone network. Hence there arises the need for different types of devices in computer networks. **Network devices provide transportation of data that needs to be transferred between end-user devices.** They extend and combine cable connections, convert data from one format to another, and control data transmission. Examples of devices that perform these functions are repeaters, hubs, switches, and routers.

Network card (NIC/NIU/TAP)

The devices that connect the end user to the network are also called terminal nodes. An example of such devices is an ordinary personal computer. To work on the network, each host is equipped with a **network Interface card** (NIC), also called a network adapter. As a rule, such devices can function without acomputer network.

A network adapter is a printed circuit board that is inserted into a slot on the motherboard of a computer, or an external device. Each NIC adapter has a unique code called a **MAC address**. This address is used to organize the operation of these devices on the network.

Repeater

Repeaters are network devices operating at the first (physical) level of the OSI reference model. As the data leaves the sender's device and enters the network, they are converted into electrical or light pulses, which are then transmitted over the network transmission medium. Such pulses are called signals. When the signals leave the transmitting station, they are clear and easily recognizable. However, the longer the cable length, the weaker and less distinguishable the signal becomes as it passes through the network transmission medium. The purpose of using a repeater is to regenerate and resynchronize network signals,which allows them to be transmitted over a longer distance through the medium.

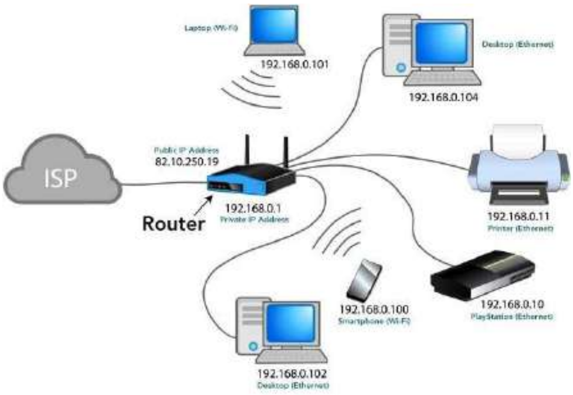
Hub

Hub is a network device used to combine devices. The hub can have from 8 to 32 ports for connecting computers. All the information that comes to the connector of one port will be copied automatically and sent to ALL other ports. The simplest hub is a multiport repeater.

Router

A router is a network device that facilitates and establishes a connection between a local network and the Internet by transmitting information to and from packet-switched networks. It performs this function by analyzing the data packet header, which contains the IP address of the packet destination. Based on the data packet, the router determines the most efficient route to the destination address. Simply put, a router routes information between connected networks.

The router is physically connected to the modem and other devices. The router creates a private network by receiving data from the Internet from the modem, which is connected via cable, DSL or other wired connection from an Internet service provider. Routers have several ports from which you can connect to devices to distribute Internet connectivity. By means of communication between modems and devices in the local network, the router facilitates communication with the Internet and within the network. The router provides connectivity at the network level of the system and thus functions at the third level of the OSI model.

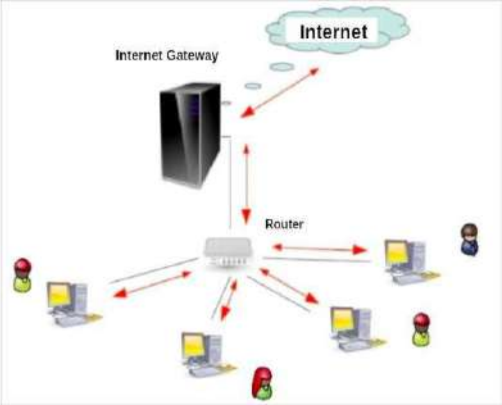


Working of a Router

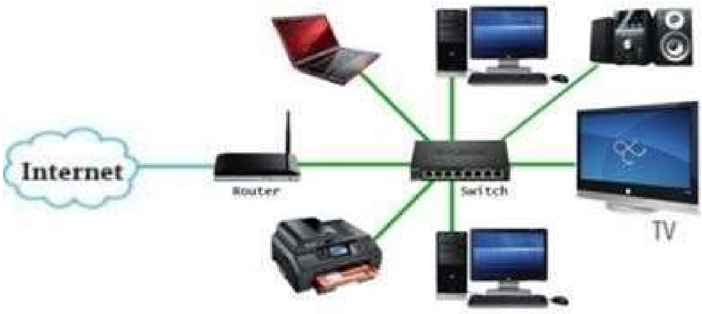
This device also performs the functions of the Dynamic Host Configuration Protocol (DHCP), distributing private IP addresses between devices connected to the network. Routers for home or office have a privateor local address obtained from a reserved range of IP addresses. Devices on the network can have the same private IP address as devices in the neighbouring house. This is not a problem, since the devices are separately connected to different routers with a specific public IP address. Thus, the private IP address functions only so that the router can identify the device.

Gateway

A gateway is considered as a network device that acts as an entry point from one network to another. The main task of a network gateway is to convert protocol(rules for communicaiton over the data network) between networks. A network gateway can accept a packet formatted for one protocol (for example, Apple Talk) and convert it into a packet of another protocol (for example, TCP/IP) before sending it to another network segment. Network gateways can be a hardware solution, software, or both, but usually itis software installed on a router or computer. The network gateway must understand all the protocols used by the router.



aptops and other devices to a shared local network. For example, take a large company with dozens and hundreds of employees. There is a marketing department, a sales department, financiers, a director. They need to exchange information, use common tables and programs.Doing this via the Internet is inconvenient and dangerous (if we talk about observing trade secrets). It is better to combine working computers into a common closed network, where there is no access tooutsiders. For large video surveillance systems, switches are also needed. Switches are also used at home.



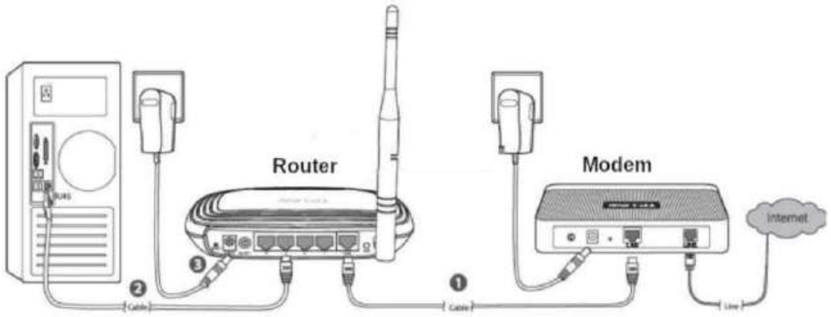
Switch at home

Switch is also a network device used to connect multiple devices together like Hub. But the difference between the hub and switch is that hub forward the received messages to all the connecting devices and switch forward the message to the intended device only. So switch is known as the intelligent device.

Modem modulator / demodulator

A modem is a device that converts a digital signal into an analog signal and vice versa. The modem connects the user's computer or laptop to the Internet. It works in two directionsat once:

- Receives a digital signal from a PC, converts it to analog (in the form of a wave)and transmits the request to the servers storing the necessary information;
- Receives the response to the sent request in analog form, converts it to digital andtransmits it to the PC



Connection of a Modem with Router

Nowadays the router and modem are combined together in a single device. The device is called a router.

Supplementary notes on Network Model and Addressing methods

Network model

The OSI model, is the core on which any modern network and devices connected to it are managed and interact. There are 7 levels in the OSI model.

Level	Name of layer	Devices working in the layer
Level 7	Application	-
Level 6	Presentation	-
Level 5	Session	-
Level 4	Transport	-
Level 3	Network	Router, Gateway
Level 2	Data link.	Network Switch, Modem

Addressing of Devices in Computer Networks:

Each network computer has as many as three addresses: physical (MAC address), network (IP address) andsymbolic (regular computer name or full domain name)

To transmit data in local and global networks, the sending device must know the address of the receiving device. Therefore, each network computer has a unique address, and not one, but as many as three addresses: physical or hardware (MAC address); network (IP address); symbolic (regular computer name or full domain name).

Physical address of the computer

The physical (hardware) address of the computer depends on the technology with which the network is built. In Ethernet networks, this is the MAC address of the network adapter. The MAC address is hard-wired into the network card by its manufacturer and is usually written as 12 hexadecimal digits (for example, 00-03-BC-12-5D-4E).

This is guaranteed to be a unique address: the first six characters identify the manufacturer, which ensuresthat the remaining six characters are not repeated on the production line. The MAC address is selected by the network equipment manufacturer from the address space allocated for it under the license. When a machine's network adapter is replaced, its MAC address also changes.

You can find out the MAC address of your computer's network card as follows:

1. Go to "Start" – "Run" - enter the command cmd – "OK" from the keyboard.
2. Enter the ipconfig /all command and press Enter.

This command allows you to get complete information about all PC network cards. Therefore, find thePhysical address line in this window – it will indicate the MAC address of your network card.

The network address of the computer

The network address or IP address is used in TCP/IP networks when exchanging data at the network level. IP stands for Internet Protocol . The computer's IP address is 32 bits long and consists of four parts called octets. Each octet can take values from 0 to 255 (for example, 90.188.125.200). Octets are separated fromeach other by dots.

The IP address of a computer, for example 192.168.1.10, consists of two parts – the network number(sometimes called the network identifier) and the network computer number (host identifier). The network number must be the same for all computers on the network and in our example the network number will be 192.168.1. The computer number must be unique in this network, and the computer in our example has the number 10.

The IP addresses of computers on different networks may have the same numbers. For example, computers with IP addresses 192.168.1.10 and 192.168.15.10, although they have the same numbers (10),but belong to different networks (1 and 15). Since the network addresses are different, computers cannot be confused with each other.

The IP addresses of computers on the same network should not be repeated. For example, it is unacceptable to use the same addresses 192.168.1.20 and 192.168.1.20 for two computers on your local network. This will lead to their conflict. If you turn on one of these computers earlier, when you turn on the second computer, you will see a message about an erroneous IP **address:conflict** of IP addresses with another system on the net in this case, just change the address on one of the computers.

To separate the network number from the computer number, a subnet mask is used. Outwardly, the subnet mask is the same set of four octets separated by dots. But, as a rule, most of the digits in it are 255and 0.

If your computer is connected to a local network or the Internet, you can find out its IP address and subnetmask in a way that is already familiar to us:

1. Go to "Start" – "Run" - type cmd and click OK.

2. In the window that opens, enter the ipconfig /all command and press Enter.
You will see the computer's IP address and subnet mask in the corresponding lines:

Internal IP addresses are reserved for local networks (they cannot be accessed via the Internet withoutspecial software) from the ranges:

192.168.0.1 – 192.168.254.254
10.0.0.1 – 10.254.254.254
172.16.0.1 – 172.31.254.254

From these ranges, you, as a system administrator, will assign addresses to computers in your local network. If you "rigidly" fix the IP address in the computer settings, then such an address will be called static – it is a permanent, unchangeable IP address of the PC.
There is another type of IP addresses – dynamic, which change every time a computer enters the network.The DHCP service is responsible for managing the dynamic address allocation process.

Name of the network computer

In addition to physical and network addresses, a computer can also have a symbolic address – the name ofthe computer. The computer name is a more convenient and understandable designation for a computer on the network.

Questions:

1. The length of a network segment in a LAN network is more than 100meteres. Select the device to beconnected to maintain the strength of signal:
   a. Switch
   b. Router
   c. Gateway
   d. Repeater
2. Select the device that helps to transfer the digital signals to be transferred over telephone lines:
   a. Switch
   b. Modem
   c. Gateway
   d. Repeater

3. Which of the following devices causes congestion if conneced in a Computer Network?
   a. Switch
   b. Modem
   c. Gateway
   d. Hub

4. The System Administrator at Gyan international school wants to connect the LAN network at the schoolto the internet. Help him to choose the correct device for the job:
   - a. Switch
   - b. Repeater
   - c. Router
   - d. Hub

5. The Gyan international school has installed 40 computers in its Computer lab. Choose the correct deviceto form a LAN network involving the 40 computers.
   - a. Switch
   - b. Repeater
   - c. Gateway
   - d. Hub

6. The device used to connect two networks using different protocols is:
   - a. Router
   - b. Repeater
   - c. Gateway
   - d. HUB

7. The connector used for networking is:
   - a. RJ - 11
   - b. RI – 11
   - c. RJ - 45
   - d. RI- 45

8. What is the difference between a Hub and a Switch?

9. What is the difference between a Router and a Gateway ?

10. Why switch is called an intelligent device”

Solutions:

1. d. Repeater – The repeater amplifies the input signal to make up the loss in strength.
2. b. Modem – Modulator-Demodulator converts digital signal to anlog and vice-versa.
3. d. Hub -
4. c. Router
5. a. Switch
6. c. Gateway
7. c. RJ – 45 . RJ stands for Registered Jack.
8. The hub receives network data on one port and simply send information to all devicesConnected to it. Such data transmission has disadvantages:
   - a. Heavy load on the network (data is sent to all computers on the networkat once);
   - b. A large number of errors, especially when new computers appear;
   - c. It is impossible to separate the flows of information, to send it in a targeted manner.

9.A gateway is a network device that allows a network to communicate with another network with other protocols (rules for communication). Gateways act as a network point that acts as an entrance to another network. A router connects two or more data lines, so when a packet arrives through one line, the router reads the packet address information and determines the correct destination. These days, routers are mostly available with built-in gateway systems, making it easier for users who don't need to buyseparate systems.

10.Switch forward the message to the intended user only. It does not use the broadcast technology

Networking Topologies:

Topologies: The arrangement of computers and other peripherals in a network is called its topology. Common network topologies are **bus, star mesh, and tree**

Bus Topology

In bus topology all the nodes are connected to a main cable called backbone. If any node has to send some information to any other node, it sends the signal to the backbone. The signal travels through the entire length of the backbone and is received by the node for which it is intended. A small device called terminator is attached at each end of the backbone. When the signal reaches the end of backbone, it is absorbed by the terminator and the backbone gets free to carry another signal.

Characteristics of Bus topology:

- ✓ It is easy to install.
- ✓ It requires less cable length
- ✓ It is cost effective.
- ✓ Failure of a node does not affect the network.
- ✓ Fault diagnosis is difficult.
- ✓ At a time only one node can transmit data.

Star Topology:

In star topology each node is directly connected to a hub/switch. Star topology generally requires more cable than bus topology.

Characteristics of Star topology:

- It is more efficient topology
- It is easy to install
- It is easy to diagnose the fault
- It is easy to expand
- Failure of hub/switch leads to failure of entire network
- It requires more cable length
-

Tree Topology:

Tree topology is a combination of bus and star topologies. It is used to combine multiple star topology networks. All the stars are connected together like a bus.

Characteristics of Tree topology:

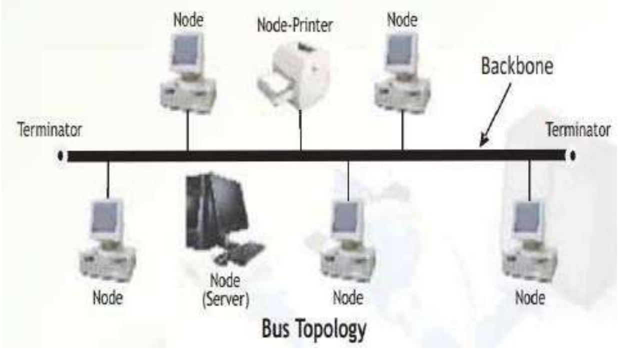
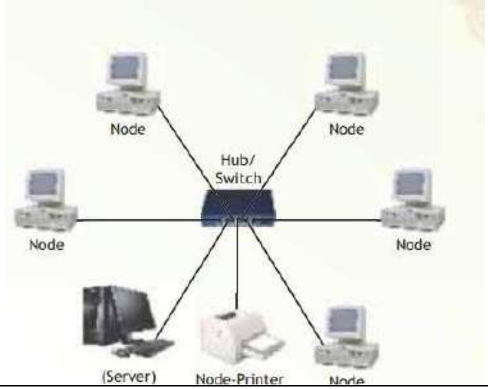
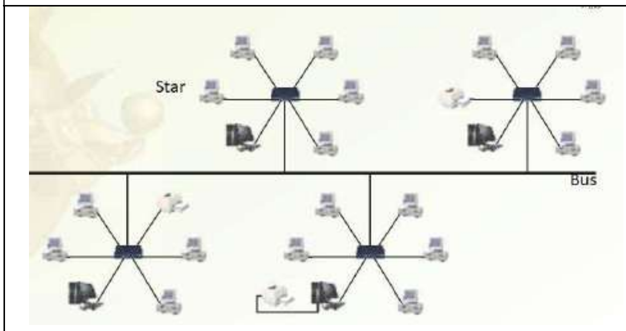
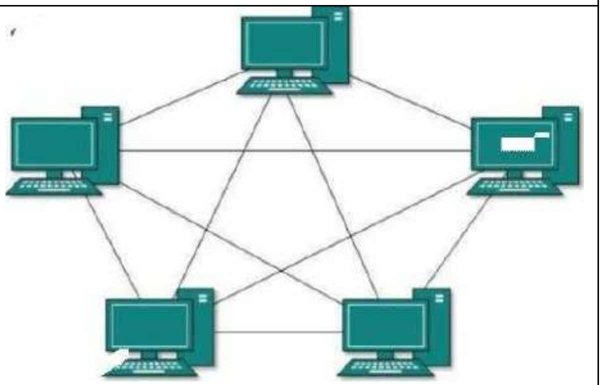
- It offers easy way of network expansion.
- If one network (star) fails, the other networks remain connected and working.

Mesh Topology :

In this networking topology, each communicating device is connected with every other device in the network. To build a fully connected mesh topology of n nodes, requires n(n-1)/2 wires.

Characteristics of Mesh topology:

- Failure during a single device won’t break the network.
- There is no traffic problem.
- It provides high privacy and security.
- A mesh doesn’t have a centralized authority.
- It’s costly.
- Installation is difficult

BUS	STAR
 Node Node-Printer Node Backbone Terminator Terminator Node Node (Server) Node Node Bus Topology	 Node Node Hub/ Switch Node Node (Server) Node-Printer Node
TREE	**MESH**
	

Introduction to Internet:

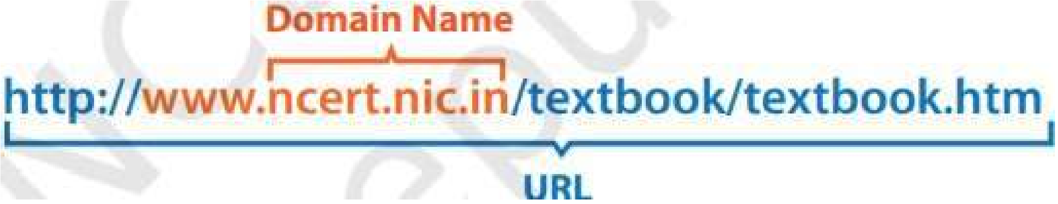
The Internet is the global network of computing devices including desktop, laptop, servers, tablets, mobile phones, other handheld devices as well as peripheral devices such as printers, scanners, etc. In addition, it consists of networking devices such as routers, switches, gateways, etc. Today, smart electronic applianceslike TV, AC, refrigerator, fan, light, etc., can also communicate through the Internet.

Applications of Internet

- The World Wide Web (WWW)
- Electronic mail (Email)
- Chat
- Voice Over Internet Protocol (VoIP)

The World Wide Web (WWW): The World Wide Web (WWW) or web in is information stored in interlinked web pages and web resources. The resources on the web can be shared or accessed through the Internet.Three fundamental technologies HTML,URL and HTTP leads to creation of web.

URL : A Uniform Resource Locator (URL) is a standard naming convention used for accessing resources over the Internet. URL is sometimes also called a web address. In below URL, http is the protocol name, it can be https, http,FTP, Telnet, etc. www is a sub domain. ncert.nic.in is the domain name



Electronic mail (Email) : Electronic mail is a means of sending and receiving message(s) through the Internet. The message can be either text entered directly onto the email application or an attached file (text, image audio, video, etc.) stored on a secondary storage. To use email service, one needs to register with an email serviceprovider by creating a mail account.

Chat : Chatting or Instant Messaging (IM) is communicating in real time using text message(s).

Voice Over Internet Protocol (VoIP): Voice over Internet Protocol (VoIP) allows you to have voicecalls over digital networks.

Points To Rember :

- ★ In Bus topology Nodes connected using single wire, cost effective, easy to install and fault diagnoseis difficult.
- ★ In star topology each Nodes is directly connected to hub/switch easy to install, expensive and easyto diagnose faults.
- ★ Tree is combination of star and bus.

- ★ Mesh topology each device is connected to every other device. No centralized device, andexpensive
- ★ WWW (World Wide Web)where documents and other web resources are identified by UniformResource Locator.
- ★ URL is a reference to a web resource that specifies its location on a computer network and amechanism for retrieving it.
- ★ Chat is real time texting.
- ★ VoIP allows voice calls.

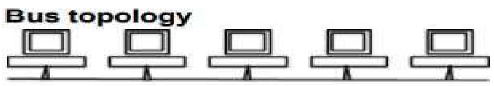
Questions:

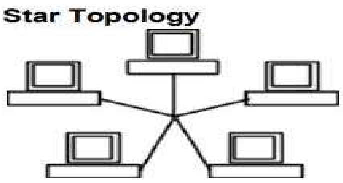
1. Physical arrangement of computers in a network is called network is called___.
2. In______topology all the nodes are connected to a single cable.
3. Network topology in which you connect each node to the network along a single piece of cable iscalled _____
4. In___________Topology, a dedicated link connects device to central controller
5. In Star topology if central hub fails, it effects
   a. No effects b. Entire system c. Particular Node
6. Which of the following topologies is a combination of more than one topologies?
   a. Bus b. Tree c. Star d. None of these
7. Identify the type of topology from the following:
   a) Each node is connected with the help of a single cable.
   b) Each node is connected with central switching through independent cables.
8. Illustrate the layout for connecting 5 computers in a Bus and a Star topology of Networks.
9. Identify valid URL from the following
   a. http://www.cbse.nic.in/welcome.htm, b . www.cbse.nic.in/ http://welcome.htmc . http:// welcome.htm
10. Identify the protocol from the following .http://www.cbse.nic.in/welcome.htm
11. Guru wants to send a report on his trip to the North East to his mentor. The report contains images and videos. How can he accomplish his task through the Internet?
12. URL stands for
13. VoIP stands for
14. Name the protocol allows to have the voice call over the Internet
15. Which of the following will you suggest to establish the real-time textual communication between thepeople.
    a. E-mail
    b. Video Conferencing
    c. Chatting
    d. Real time communication is not possible

Answers:

1. Topology
2. Bus.
3. Bus
4. Star
5. Entire system

6. Tree
7. (a). BUS (b). Star
8.





9. http://www.cbse.nic.in/welcome.htm
10. http
11. E-mail
12. Uniform Resource locator
13. Voice over Internet Protocol
14. VoIP
15. Chatting

Website:-

Website is a group of web pages, containing text, images and all types of multi-mediafiles

Difference between Website and Webpage

Website	WebPage
A collection of web pages which aregrouped together and usually connected together in various ways,Often called a "web site" or simply a"site. Eg: CBSE website	A document which can be displayed ina web browser such as Firefox, GoogleChrome, Opera, Microsoft Internet Explorer etc Result web page of CBSE
Contains information about variousTopics	Contents information about single topic
Web Site address doesn't depend upon webpage address	Depends upon web page address
Development time is more	Less Development time required

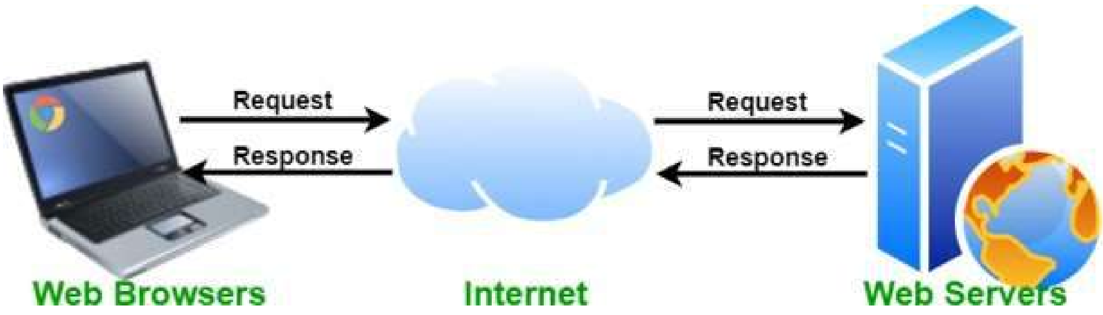
Difference between Static and Dynamic webpage

Static webpage content is constant inall time	The page content changes accordingto the user.
Loading time is less	Loading time is more
No database is used	A database is used in the server side

Content changes rarely	Content changes constantly

Web Server :-

A web server is a computer that stores web server software and a website's component files (e.g. HTML documents, images, CSS style sheets, and JavaScript files).When client sends request for a web page, the web server search for the requested page if requested page is found then it will send it to client with an HTTP response. If the requested web page is not found, web server will the send an HTTP response :Error 404 Not found.



Web Hosting :-

Web hosting is an online service that enables you to publish your website or web application on the internet. When you sign up for a hosting service, you basically rent some space on a server on which you can store all the files and data necessary for your website to work properly. A server is a physical computer that runs without anyinterruption so that your website is available all the time for anyone who wants to see it

Web Browser :- A web browser, or simply "browser," is an application used to access and view websites. Common web browsers include Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, and Apple Safari.

Add-ons(in terms of Hardware): An Add-on is either a hardware unit that can be added to a computer to increase the capabilities or a program unit that enhances primary program. Some manufacturers and software developers use the term add-on. Examples of add-ons for a computer include card for sound, graphic acceleration, modem capability and memory. Software add- on are common for games, wordprocessing and accounting programs

Plug-ins:- a plug-in (or plugin, add-in, add-on) is a software component that adds a specific feature to an existing computer program. When a program supports plug-ins, it enables customization. Plug-ins are commonly used in Internet browsers but alsocan be utilized in numerous other types of applications

Cookies :- cookies are small files which are stored on a user's computer and contains information like which Web pages visited in the past, logging details Password etc. They are designed to hold a small amount of data specific to a particular client and website and can be accessed by the web server or the client computer

Multiple choice questions:

1.A website is a collection of
(a) HTML documents (b) Graphic files (c)Audio and video files (d)All of the above

2.The first page that we normally view at a website is called _________ (a)Home page (b)Webpage (c) Webserver (d)Email

3.Which of the following is not a web browser?
(a) Google Chrome (b) Mozilla Firefox (c)Opera (c)MS word

4.Which of the following is a web browser?
(a) Adobe Photoshop (b) Coral Draw (c) Apple Safari (d) MS word

5.Which of the following button allows you to move to the previously visited page onthe browser?
a) Back (B)Previous (c) Last (d)Reverse

6.Which of the following is peace of information stored in a form of a text file and thathelps in customizing the displayed information, login, showing data based on user'sinterests from the web site?
(a) Extension (b) Cookies (c)Login (d)Session

7.The space provided by a service provider to store website data is called _______________.

(a) Webspace (b)Cloud Computing (c)Web Hosting (d)Web Store

8. _______________is an online service that enables you to publish your website or webapplication on the internet
(a) Web server (b) Web Browser (c)Web Hosting (d) None

9.____________is a a software component that adds a specific feature to an existingcomputer program

(a) Addon (b)Plug in (c) Cookies (d) All of the above

10. The first page on the website that allows you to navigate to other pages by menusor links is known as ________
(a) front page (b)primary page (c)Home page (d)

NoneFill in the blanks questions:-

1. A_____________is a collection of web pages written using HTML.

2. A computer on which the website is hosted and it is connected to the internet alltime is known as____.
3. The__________of a website are linked together with different hyperlinks and share acommon interface and design.
4. An interactive web page is created through ____________
5. The space provided by a service provider to store website data is called _____

Answers

Multiple choice questions:

1.a. 2.a 3. c 4 .c 5.a 6.b 7c 8.c 9,b 10.c

Fill in the blanks:

1.Website 2.Web server 3.Web pages 4.HTML and scripting languages 5.WebHosting

Descriptive Questions and answers:

1.Differentiate between web browser and web serverWeb Server :-

A web server is a computer that stores web server software and a website's component files (e.g. HTML documents, images, CSS style sheets, and JavaScript files).When client sends request for a web page, the web server search for the requested page if requested page is found then it will send it to client with an HTTP response. If the requested web page is not found, web server will the send an HTTP response

:Error 404 Not found.Web Browser :-

A web browser, or simply "browser," is an application used to access and view websites. Common web browsers include Microsoft Internet Explorer, Google Chrome,Mozilla Firefox, and Apple Safari

2.Differentiate between eb page and home page?
Web page:- A document using http and resides on a website is called webpageHome page:-It is the page that gets displayed first when we open a webpage.

3.Differentiate between dynamic and static webpages?Ans:

Static webpage content is constant inall time	The page content changes accordingto the user.
Loading time is less	Loading time is more
No database is used	A database is used in the server side
Content changes rarely	Content changes constantly

4.Write the steps to host a website:;Ans:-
Following steps needs to followed to host a website:

1. Go and search for the hosting provider companies online
2. Find a suitable domain name for your website
3. Register your domain name with the Domain Name Registrar
4. Once you get to space, create your login
5. Upload your localhost website files on the allocated space
6. Map you domain name with IP address
7. What are the components of a web site? Explain in detail.

1. Webhosting – A space or computer provided by a service provider to store websitedata
2. Address – A unique URL rendered by the browser when the request sent by the user
3. Homepage – The first page of a website when the website is launched
4. Design – The theme and interface design including the layout of the website
5. Content – The text, images, links, and other media files included in the web page
6. Navigation Structure – A structure that navigates from one page to another
7. Explain the following terms:

(a)Website (b) Webpage (c) Homepage (d)Webserver

Web Site	Web Page	Home Page	Web Server
Group of related web pages hostedon a web server	A document thatuses HTTP	The top level pageof web site	A web server is a computer that stores web serversoftware and a website's component files (e.g. HTML documents, images,CSS style sheets, and JavaScript files)

Website:-

Website is a group of web pages, containing text, images and all types of multi-mediafiles.

Some examples of websites:

- Google.com
- cbse.nic.in
- Amazon.com
- Wikipedia.org

Difference between Website and Webpage

Website	WebPage
A collection of web pages which are grouped together and usually connected together in various ways, Often called a "web site" or simply a "site. Eg: CBSE website	A document which can be displayed in a web browser such as Firefox, Google Chrome, Opera, Microsoft Internet Explorer etc Eg: Result web page of CBSE A webpage is commonly written in HTML
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Less complex	Complex

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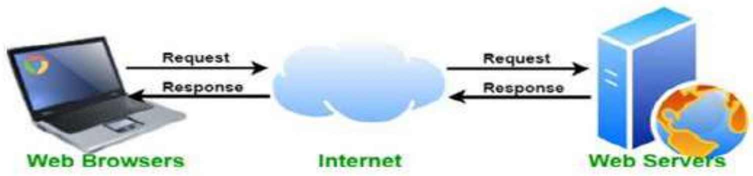

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Plug-ins: - a plug-in (or plugin, add-in, add-on) is a software component that adds a specific feature to an existing computer program. When a program supports plug-ins, it enables customization. Plug-ins are commonly used in Internet browsers but also can be utilized in numerous other types of applications. An example of a plugin is the free Macromedia Flash Player, a plugin that allows the web browser to display animations using the Flash format.

Note: Plug-in is a complete program where add-on is not a complete program.

Cookies: - cookies are small text files which are stored on a user's computer and contain information like which Web pages visited in the past, logging details Password etc. They are designed to hold a small amount of data specific to a particular client and website and can be accessed by the web server or the client computer.

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5. The space provided by a service provider to store website data is called ______
6. The ____________ is an application program that is used to view the web pages.

Answers
Multiple choice questions:
1.a. 2.a 3. d 4 .c 5.a 6.b 7c 8.c 9.b 10.c
Fill in the blanks:

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Index

UNIT 4
SOCIETAL IMPACTS

- Digital footprint, net and communication etiquettes,
- Data protection, intellectual property rights (IPR), plagiarism, licensing and copyright,
- Free and open source software (FOSS),
- Cybercrime and cyber laws, hacking, phishing, cyber bullying, overview of Indian IT Act.
- E-waste: hazards and management. Awareness about health concerns related to the usage of technology.

DIGITAL FOOTPRINT

A digital footprint – refers to the trail of data you leave while using the internet. It includes websites you visit, emails you send, and information you submit online. A digital footprint can be used to track a person's online activities and devices.

Internet users create their digital footprint either actively or passively. A passive footprint is made when information is collected from the user without the person knowing this is happening. An active digital footprint is where the user has deliberately shared information about themselves either by using social media sites or by using websites

Digital footprint examples

Online shopping
- Making purchases from e-commerce websites

Online banking
- Using a mobile banking app

Social media
- Using social media on your computer or devices
- Sharing information, data, and photos with your connections

Reading the news
- Subscribing to an online news source

Health and fitness
- Using fitness trackers
- Using apps to receive healthcare

NETIQUETTE

It is the abbreviation of **Internet etiquette** or **network etiquette**, refers to online manners while using internet or working online. While online you should be courteous, truthful and respectful of others. It includes proper manners for sending e-mail, conversing online, and so on.

Some basic rules of netiquette are:

- Be respectful
- Think about who can see what you have shared.
- Read first, then ask
- Pay attention to grammar and punctuation
- Respect the privacy of others
- Do not give out personal information

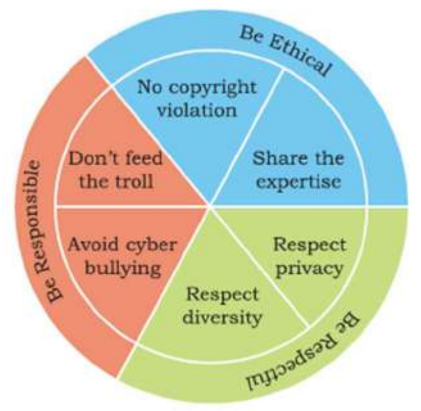


Figure 6.2: Net etiquettes

DATA PROTECTION

Data protection is a set of strategies and processes you can use to secure the privacy, availability, and integrity of your data. It is sometimes also called data security or information privacy. A data protection strategy is vital for any organization that collects, handles, or stores sensitive data.

Data Privacy v/s Data Protection

For data privacy, users can often control how much of their data is shared and with whom. For data protection, it is up to the companies handling data to ensure that it remains private. Data privacy is focused on defining who has access to data while data protection focuses on applying those restrictions.

How we can protect our personal data online

- Through Encrypt our Data
- Keep Passwords Private
- Don't Overshare on Social Networking Sites
- Use Security Software
- Avoid Phishing Emails
- Be Wise About Wi-Fi
- Be Alert to Impersonators
- Safely Dispose of Personal Information

INTELLECTUAL PROPERTY RIGHTS (IPR)

Intellectual Property (IP) – is a property created by a person or group of persons using their own intellect for ultimate use in commerce and which is already not available in the public domain.
Examples of Intellectual Property :- an invention relating to a product or any process, a new design, a literary or artistic work and a trademark (a word, a symbol and / or a logo, etc.)

Intellectual Property Right (IPR) is the statutory right granted by the Government, to the owner(s) of the intellectual property or applicant(s) of an intellectual property (IP) to exclude others from exploiting the IP commercially for a given period of time, in lieu of the discloser of his/her IP in an IPR application.

Copyright laws protect intellectual property
Copyright It is a legal concept, enacted by most governments giving creator of original work exclusive rights to it, usually for a limited period.
Copyright infringement – When someone uses a copyrighted material without permission, it is called Copyright infringement.
Patent – A patent is a grant of exclusive right to the inventor by the government. Patent give the holder a right to exclude others from making, selling, using or importing a particular product or service, in exchange for full public disclosure of their invention.
Trademark – A Trademark is a word, phrase, symbol, sound, colour and/or design that identifies and distinguishes the products from those of others.

PLAGIARISM

Plagiarism It is stealing someone's intellectual work and representing it as your own work without citing the source of information.
Any of the following acts would be termed as Plagiarism:

- Using some other author's work without giving credit to the author
- Using someone else's work in incorrect form than intended originally by the author or creator.
- Modifying /lifting someone's production such as music composition etc. without attributing it to the creator of the work.
- Giving incorrect source of information.

LICENSING AND COPYRIGHT

Licenses are the permissions given to use a product or someone's creation by the copyright holder.
Copyright is a legal term to describe the rights of the creator of an original creative work such as a literary work, an artistic work, a design, song, movie or software etc.

FREE AND OPEN-SOURCE SOFTWARE (FOSS)

OSS refers to Open Source Software, which refers to software whose source code is available to customers and it can be modified and redistributed without any limitation.

Free and open-source software (FOSS) is software that can be classified as both free software and open-source software. That is, anyone is freely licensed to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software.

CYBER CRIME

Any criminal or illegal activity through an electric channel or through any computer network is considered as cyber crime.
Eg: Cyber harassment and stalking, distribution of child pornography,types of spoofing, credit card fraud ,. etc

CYBER LAW

It is the law governing cyberspace which includes freedom of expression, access to and usage of internet and online privacy.
The issues addressed by cyber law include cybercrime, e-commerce, IPR and Data protection.

HACKING:

It is an act of unauthorised access to a computer, computer network or any digital system.
Hackers usually are technical expertise of hardware and software.

- Hacking when done with a positive intent is called as **Ethical hacking or White hat**.
- Hacking when done with a negative intent is called as **Unethical hacking or Black hat**.

PHISHING:

It is an unlawful activity where fake websites or emails appear as original or authentic .This sites when clicked by the user will collect sensitive and personal details like usernames, password, credit card details etc.

CYBER BULLYING:

It is the use of technology to harass , threaten or humiliate a target .
Example: sharing of embarrassing photos or videos, posting false information, sending mean text., etc.

OVERVIEW OF INDIAN IT ACT:

The Government of India's – 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

E-waste - HAZARDS AND MANAGEMENT:

Various forms of electric and electronic equipment which no longer satisfy their original purpose are termed as Ewaste. This includes Desktop, Laptop, Projectors, Mobiles,etc

- **HAZARDS:**It consists of mixtures of various hazardous organic and inorganic materials which when mixed with water/soil may create threat to the environment.
- **MANAGEMENT:** Sell back, gift/donate, reuse the parts giveaway to a certified e-waste recycler

ABOUT HEALTH CONCERNS RELATED TO THE USE OF TECHNOLOGY:

There are positive as well as negative impact on health due to the use of these technologies.

- **POSITIVE IMPACT**
  - Various health apps and gadgets are available to monitor and alert
  - Online medical records can be maintained
- **NEGATIVE IMPACT**
  - One may come across various health issues like eye strain, muscle problems, sleep issues,etc
  - Anti social behaviour, isolation, emotional issues, etc.

OBJECTIVE TYPE QUESTIONS(1 mark)

1. A copyright is automatically granted to authors or creators of content. (True/False)
2. In FOSS source code is usually hidden from the users. (True/False)
3. The practice of taking someone else's work or ideas and passing them off as one's own is known as _____________
4. A mail or message sent to a large number of people indiscriminately without their consent is called____________
5. Receiving irreleavnt and unwanted emails repeatedly is an example of ______________.
6. The generally recognized term for the government protection afforded to intellectual property (written and electronic) is __________.
7. A software which can be freely accessed and modified is called ___________
8. Freeware is copyrighted software that is freely available to use.(True/False)
9. _______ is a secure technique to protect data being transmitted over a network.
10. ________ are the etiquettes that are to be followed while communicating online.

MULTIPLE CHOICE QUESTIONS

1. Online posting of rumours, giving threats online, posting the victim's personal information, comments aimed to publicly ridicule a victim is termed as __________

a. Cyber bullying
b. Cyber crime
c. Cyber insult
d. All of the above

2. Ankit made a ERP - Enterprise resource planning solution for a renowned university and registered and Copyrights for the same. Which of the most important option; Ankit got the copyrights.

a) To get society status
b) To get fame
c) To get community welfare
d) To secure finance protection

3. Which of the following is not an example of Social media platform?

a. Facebook
b. Pinterest
c. Google+
d. Social channel

4. A responsible netizen must abide by __________

a. Net etiquettes
b. Communication etiquettes
c. Social media etiquettes
d. All of the above

5. A ___________ is some lines of malicious code that can copy itself and can have detrimental effect on the computers, by destroying data or corrupting the system.

a. Cyber crime
b. Computer virus
c. Program
d. Software

6. Which of the following activity is an example of leaving Active digital footprints?

a) Surfing internet
b) Visiting a website
c) Sending an email to a friend
d) None of the above

7. You are planning to go for a vacation. You surfed the internet to get answers for following queries.

a) Places to visit
b) Availability of air tickets and fares
c) Best hotel deals
d) All of these

Which of the above-mentioned actions might have created a digital footprint?

8. Legal term to describe the rights of a creator of original creative or artistic work is called……..

a) Copyright
b) Copyleft
c) GPL
d) BSD

9. Intellectual Property is legally protected through ____

a)	copyright
b)	patent
c)	registered trademark
d)	All of the above

10. _____________ includes any visual symbol, word, name, design, slogan, label, etc., that distinguishes the brand from other brands.
a)	Trademark
b)	Patent
c)	Copyright
d)	None of the above

11. Gaining unauthorised access to a network or computer aur digital files with malicious intentions, is
called_________
a. Cracking
b. Hacking
c. Banging
d. Phishing

12. Legal term to describe the rights of a creator of original creative or artistic work is called _____
a. Copyright
b. Copyleft
c. GPL
d. None of these

13. OSS stands for
a. Open system security
b. Open system source
c. Open software and security
d. Open source software

14.Any fraudulent business practice that extracts money e from an unsuspecting, ignorant person is called_______
a. Stealing
b. Scam
c. Violation of copyright
d. Digital footprint

15.________ means no price is to be paid for the software.
a. Free software

b. Freeware
c. shareware
d. Open source software

16.Any work / information that exist in digital form idea on internet or on an electronic device, is known as________________ property.
a. Licence property
b. digital property
c. source code property
d. software property

17.Discarded electrical or or electronic devices are known as____________.
a. E waste
b. Software Waste
c. Hardware waste
d. Computer waste

18.The least restrictive open sourcelicence is________ licence.
a. Apache Licence
b. MIT licence
c. GNU licence
d. BSD licence

19. The original code written by programmers for a software is known as______________
a. Object code
b. Source code
c. Python code
d. Language code

20. ____________ means freedom to use the software.
a. Plagiarism
b. Freeware
c. Open software
d. Free software

21. IAD means _________________
a. Internet advanced data
b. Internet addiction disorder
c. Internet advanced digitalization
d. Internet aggregate data

22. The__________ is the Digital trail of your activity on the internet.
a. Copyleft
b. Digital footprint

c. Digital data
d. Internet property

23.The ________ the are the permissions given to use a product or someone's creator by the copyright holder.
a. Source code
b. Licence
c. Software authority
d. Digital rights

24.____________ is a licence that gives right opposite to copyright.
a. Left copy
b. Digital copy
c. Copyleft
d. IPR

25. A software that can be freely accessed and modified is called
a. synchronous software
b. package software
c. open source software
d. middleware.

26.Which of the following is an advantage of open source software?
a. You can edit the source code to customise it
b. you need to be an expert to edit code
c. you have to pay
d. can sometimes with two generic for specialist purposes.

27.Which of the following is a disadvantage of open source software?
a. high quality software with lots of features.
b. not as customizable
c. may not have been tested as much as proprietary software so might have bugs.
d. you can added the source code to customize it

28.Which of the following is an advantage of proprietary software?
a. It is usually free
b. thoroughly tested because people are paying to use it.
c. Not as customizable.
d. Can sometimes be to generate for specialist purposes.

29.Which of the following is a disadvantage of proprietary software?
a. You need to be an expert to edit code.
b. You have to pay for this type of software.
c. It’s licensed.

d. It is launched after proper testing.

30.The generally recognized term for the government protection afforded to intellectual property written
and electronic is called _____________
a. Computer security law.
b. Aggregate information.
c. Copyright law
d. Data security standards.

31.Which of the following would be a creative work protected by copyright?
a. A list of all Indian President names
b. A Portrait of your family
c. A song you wrote
d. The name of your pet dog

32.Which of the following is not done by cyber criminals?
a. Unauthorised account access
b. Mass Attack using trojans as botnets
c. Email spoofing and spamming
d. report vulnerabilty in any system

33.What is the name of the IT law that India is having in the Indian legislature?
a. India's Technology IT Act 2000
b. India's Digital information technology DIT Act, 2000
c. India's Information Technology IT Act, 2000
d. The technology act, 2008.

34.What is meant by the term cybercrime?
a. Any crime that uses computers to jeopardize or attempt to jeoparadise in national security
b. The use of computer networks to commit financial or identity fraud
c. The theft of Digital information
d. Any crime that involves computers and networks

35.Every activity you perform on the internet is safe for how long?
a. 1 month
b. 1 year
c. As per my setting
d. Forever

36.A _____________ is an injury or disorder of muscles, nerves, tendons, ligaments and joints.
a. Repetitive Strain injury
b. Muscle injury
c. Nervous breakdown

d. Joint pain
.
37.________________ is a technology related health condition affecting eyesight.
a. Computer vision strain
b. Computer vision syndrome
c. Eyesight syndrome
d. Vision imbalance

CASE STUDY BASED QUESTIONS

1. After practicals, Atharv left the computer laboratory but forgot to sign off from his email account. Later, his classmate Revaan started using the same computer. He is now logged in as Atharv. He sends inflammatory email messages to few of his classmates using Atharv's email account. Revaan's activity is an example of which of the following cyber crime?
a) Hacking
b) Identity theft
c) Cyber bullying
d) Plagiarism

2. Rishika 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 Garvit, her classmate. What is ethically correct for Rishika to do?
a) Inform Garvit so that he may change his password.
b) Give the password of Garvit's email ID to all other classmates.
c) Use Garvit's password to access his account.

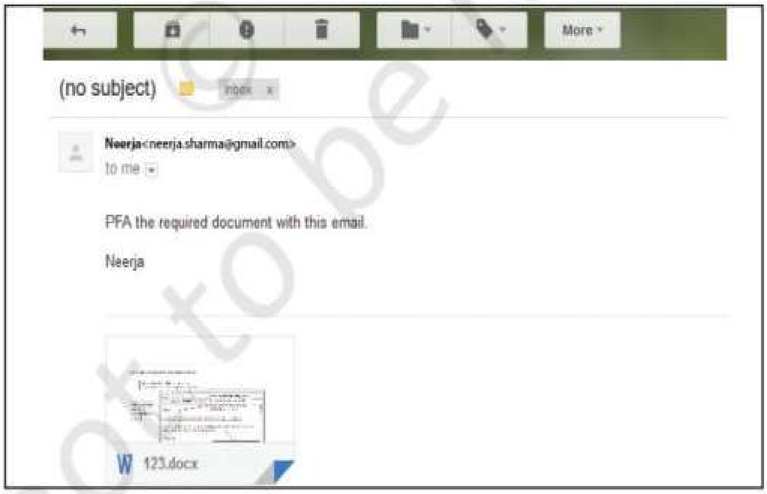
3. Suhana is down with fever. So, she decided not to go to school tomorrow. Next day, in the evening she called up her classmate, Shaurya and enquired about the computer class. She also requested him to explain the concept. Shaurya said, "Mam taught us how to use tuples in python". Further, he generously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



(no subject)

Neerja<neerja.sharma@gmail.com>
to me

PFA the required document with this email.

Neerja

123.docx

Find out which of the following email etiquettes are missing in it.
a) Subject of the mail
b) Formal greeting
c) Self-explanatory terms
d) Identity of the sender
e) Regards

7. You are planning to go on a vacation to Kashmir. You surfed the internet for the following:
i) Weather conditions
ii) Availabilty of air tickets and fares
iii) Places to visit

iv) Best hotel deals
Which of the above mentioned acts might have left a digital footprint?

a) i and ii
b) i, ii and iii
c) i, ii and iv
d) all of these

8. Naveen 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.

i) This is an example of __________ .
a. Online Fraud
b. Identity Theft
c. Phishing
d. Plagarism

ii) Someone steals Naveen's personal information to commit theft or fraud, it is called ____________
a. Online Fraud
b. Identity Theft
c. Phishing
d. Plagarism

iii) Naveen receiving an Unsolicited commercial emails is known as __________
a. Spam
b. Malware
c. Virus
d. worms

iv) Naveen's Online personal account, personal website are the examples of?
a. Digital wallet
b. Digital property
c. Digital certificate
d. Digital signature

v) Sending mean texts, posting false information about a person online, or sharing embarrassing photos or videos to harass, threaten or humiliate a target person, is called ____________
a. Eavesdropping
b. cyberbullying
c. Spamming
d. Phishing

9. Prathyush has to prepare a project on **“Cyber Jaagrookta Diwas**”.He decides to get information from the Internet. He downloads three web pages (webpage1, webpage 2, webpage 3) containing information on the given topic.

1. He read a paragraph from webpage 1 and rephrased it in his own words. He finally pasted the rephrased paragraph in his project. And he put a citation about the website he visited and its web address also.
2. He downloaded three images of from webpage 2. He made a collage for his project using these images.
3. He also downloaded an icon from web page 3 and pasted it on the front page of his project report.

(i) Step1 is an act of……………
(a) Plagiarism
(b) copyright infringement
(c) Intellectual Property right
(d) None of the above

(ii) Step 2 is an act of _______.
(a) plagiarism
(b) copyright infringement
(c) Intellectual Property right
(d) Digital Footprints

(iii) Step 3 is an act of ________.
(a) Plagiarism
(b) Paraphrasing
(c) copyright infringement
(d) Intellectual Property right

(iv) ______is a small piece of data sent from a website and stored in a user’s web browser while a user is browsing a website.
(a) Hyperlinks
(b) Web pages
(c) Browsers
(d) Cookies

(v) The process of getting web pages, images and files from a web server to local computer is called
(a) FTP
(b) Uploading
(c) Downloading
(d) Remote access

ANSWERS

OBJECTIVE TYPE QUESTIONS(1 mark)

1. True
2. False
3. Plagiarism
4. Spam
5. Spam or spamming
6. Copyright law
7. Open source software
8.True
9. Encryption
10. Netiquettes

MULTIPLE CHOICE QUESTIONS

1. a 2. **d** 3. **d** 4. **D** **5.** B **6.** C **7.** d **8. a** **9.** D **10.** A 11.b 12.a 13.d 14.b 15.b 16.b 17.a 18.b 19.b 20.d 21.b 22.b 23.b 24.c 25.c 26.a 27.c 28.b 29.b 30.c 31.c 32.d 33.c 34.d 35.d 36.a 37.b

CASE STUDY BASED QUESTIONS

1. b 2. a 3. c 4. a 5. b 6. A 7. d
8. i) c ii) b iii) a iv) b v) b
9. i) d ii) a iii) c iv) d v) c

SHORT ANSWER QUESTIONS(2 marks)

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

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

A. Impact on bones and joints: wrong posture or long hours of sitting in an uncomfortable position can cause muscle or bone injury.
B. 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.
C. Impact on eyes: This is the most common form of health hazard as prolonged hours of screen time can lead to extreme strain in the eyes.
D. Sleep problem: Bright light from computer devices block a hormone called melatonin which helps us sleep. Thus we can experience sleep disorders leading to short sleep cycles.

2. 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?

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.

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

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

4. What do you understand by Net Ettiquetes? Explain any two such ettiquetes.

Net Ettiquets refers to the proper manners and behaviour we need to exhibit while being online. These include :
1. 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.
2. Avoid cyber bullying: Avoid any insulting, degradingor intimidating online behaviour like repeated posting of rumours, giving threats online,posting the victim’s personal information, or comments aimed to publicly ridicule a victim.

5. According to a survey, one of the major asian country generates approximately about 2 million tonnes of electronic waste per year. Only 1.5 % of the total e-waste gets recycled. Suggest some methods to manage e-waste .

Buy environmentally friendly electronics
Donate used electronics to social programs
Reuse , refurbish electronics
Recycling e-waste

SAMPLE QUESTION PAPERS

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Index

(SQP SET I)

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION
INFORMATICS PRACTICES (065)
SAMPLE QUESTION PAPER - Class XII

Max Marks: 70 **Time: 3 hrs**

General Instructions:

1. This question paper contains five sections, Section A to E.
2. All questions are compulsory.
3. Section A have 18 questions carrying 01 mark each.
4. Section B has 07 Very Short Answer type questions carrying 02 marks each.
5. Section C has 05 Short Answer type questions carrying 03 marks each.
6. Section D has 03 Long Answer type questions carrying 05 marks each.
7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part c only.
8. All programming questions are to be answered using Python Language only.

	SECTION A	
1	Beauty Lines Fashion Inc. is a fashion company with design unit and market unit 135 m away from each other. The company recently connected their LANs using Ethernet cable to share the stock related information. But after joining their LANs, they are not able to share the information due to loss of signal in between. Which device out of the following should you suggest to be installed for a smooth communication? i. Repeater ii. Hub iii. Bridge iv. Switch	1
2	Which of the following is a type of cybercrime? i. Stealing of money from a purse ii. Hitting or beating someone iii. Making damage to furniture in classroom iv. Stealing of user name and password and misusing others Email	1
3	What is not an example of e-waste? i. Unused Mobile ii. Unused old Keyboard iii. Unused old computers iv. Empty cola cans	1
4	Find the output of the following SQL command: **select mid('Informatics Practices', -9);**	1
5	If a column "Mark" in student table contains the following data **MARK** 22	1

	NULL 21 23 Predict the output of the following command: SELECT AVG (MARK) FROM student; i. 22 ii. 16.5 iii. NULL iv. 66	
6	‘F’ in FOSS stands for: i. Force ii. Free iii. Fibre iv. First	1
7	Which SQL statement is used to display all the data from product table in the decreasing order of price? i. SELECT * FROM PRODUCT; ii. SELECT * FROM PRODUCT ORDER BY PRICE; iii. SELECT * FROM PRODUCT ORDER BY PRICE DESC; iv. SELECT * FROM PRODUCT ORDER BY DESC;	1
8	The number of rows in a relation in SQL is known as i. cardinality ii. degree iii. tuple iv. attribute	1
9	Which among the following is a DDL command in SQL? i. SELECT ii. INSERT iii. ALTER iv. UPDATE	1
10	To display last three rows of a series object ‘S’, you may write: i. S.Head() ii. S.Tail(3) iii. S.Head(3) iv. S.tail()	1
11	Which of the following statement will import matplotlib.pyplot library? i. Import pyplot as pd ii. import matplotlib as py iii. import matplotlib.pyplot as plt iv. All of these	1
12	Which of the following can be used to specify the data while creating a DataFrame? i. Series ii. List of Dictionaries iii. Structured ndarray	1

<table>
<tr><td></td><td>iv. All of these</td><td></td></tr>
<tr><td>13</td><td>______________protocol allows us to have voice call (telephone service) over the Internet</td><td>1</td></tr>
<tr><td>14</td><td>Write the output of the following SQL command:
SELECT ROUND(199.2936, 1);</td><td>1</td></tr>
<tr><td>15</td><td>Removal of parts containing the valuable items in E waste management is?
i. Refurbishment and reuse
ii Dismantling
iii Recycling
iv None of these</td><td>1</td></tr>
<tr><td>16</td><td>-----------------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.
i. Offline phishing
ii. Offline footprint
iii. Digital footprint
iv. Digital phishing</td><td>1</td></tr>
<tr><td colspan="3">Q17 and 18 are ASSERTION AND REASONING based questions. Mark the correct choice as
i. Both A and R are true and R is the correct explanation for A
ii. Both A and R are true and R is not the correct explanation for A
iii. A is True but R is False
iv. A is false but R is True</td></tr>
<tr><td>17</td><td>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</td><td>1</td></tr>
<tr><td>18</td><td>Assertion (A):- DataFrame has both a row and column index.

Reasoning (R): - A DataFrame is a two-dimensional labelled data structure like a table of MySQL.</td><td>1</td></tr>
<tr><td></td><td>SECTION B</td><td></td></tr>
<tr><td>19</td><td>Distinguish between LAN and WAN.
OR
Explain the function of the following network devices:
a. Modem
b. Firewall</td><td>2</td></tr>
<tr><td>20</td><td>Write SQL commands: -
a. To print the length of the string “Happy Holidays”
b. To print the string “Happy Holidays” in capital letters.</td><td>2</td></tr>
<tr><td>21</td><td>Differentiate between DDL and DML commands</td><td>2</td></tr>
<tr><td>22</td><td>Consider a given Series ,S1 with subject and marks where subject is index.<table><tr><th>Subject</th><th>Marks</th></tr><tr><td>ENG</td><td>76</td></tr></table></td><td>2</td></tr>
</table>

HINDI	88
MATH	60
SCI	85
SST	81

Write a program in Python Pandas to create the series.

23 Write down different steps of E waste Disposal. 2

OR

Mention any four net etiquettes.

24 What will be the output of the following code: 2

```
>>>import pandas as pd
>>>A=pd.Series(data=[12,20,5,50])
>>>print(A>10)
```

25 Carefully observe the following code: 2

```
import pandas as pd
Sales1={'S1':5000,'S2':8000,'S3':12000,'S4': 18000}
Sales2={'A' :13000,'B':14000,'C':12000}
totSales={1:Sales1,2:Sales2} df=pd.DataFrame(totSales)
print(df)
```

Answer the following:

i. List the index of the DataFrame df

ii. List the column names of DataFrame df.

SECTION C

26 Consider the table SPORTS given below: 3

SCode	SportName	Noofplayers	Coachname
S001	Cricket	21	Rahul Dravid
S002	Football	25	Roshan Lal
S003	Hockey	40	Sardar Singh
S004	Cricket	19	Chetan Sharma
S005	Archery	12	Limbaram
S006	Shooting	17	Deepika Kumari

a. Give output of following SQL command
Select Coachname from SPORTS Order By Coachname desc;

Write SQL commands to:

b. Write SQL command to display the total number of players in each sports.

c. Write SQL command to display sports name where the total number of players is more than 25

27 Write a Python code to create a DataFrame with appropriate column headings from the list given below: 3

[[101,'Ram',2500],[102,'Ann',5000],[103,'Sam' ,8000],[104,'Manu',4000]]

28 Consider the data frame and answer the questions 3

	TCS	Wipro	Infosys	IP
Qtr1	80	88	66	74
Qtr2	98	67	75	98
Qtr3	77	93	89	92
Qtr4	65	50	40	80

i)Write python code to display the profit rate of all quarters of Infosys company.
ii) Write python code to display the profit rate of Qtr3 of all companies
iii) Write the output of the python code

```
print(DF1.iat[1,1])
```

29 What is IT Act 2000? What is its importance? 3

OR

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

30 Identify the SQL functions to perform the following: 3

a. To print the name of the month of a specified date.
b. To print the date part of a specified date.
c. What will be the output of the following SQL Statements:
  i. Select lower(“DATA for All”);
  ii. Select instr("Wear formal uniform”, “form”);

OR

Differentiate between where and having clause with the help of suitable example

SECTION D

31 Consider the following table STUDENT. Write SQL commands for the following statements. 5

Rollno	Name	Dob	Class	Gender	Hobby	Fees
1001	BHAVYA	2001-01-02	11	F	Painting	100
1002	AARDRA	2002-10-21	1	F	Drama	200
1003	AJITH	2004-12-11	8	M	Cooking	150
1004	ARJUN	2001-02-22	10	M	Cooking	250
1005	KAVYA	2005-10-12	8	F	Sports	100
1006	ANAND	2000-02-01	1	M	Drama	120
1007	ATHUL	2006-10-11	6	M	Sports	150

1008	NEERAJA	2003-11-21	9	F	Sports	100
1009	REHNA	2003-08-07	8	F	Painting	NULL
1010	VAISAKH	2001-12-11	10	M	Cooking	120

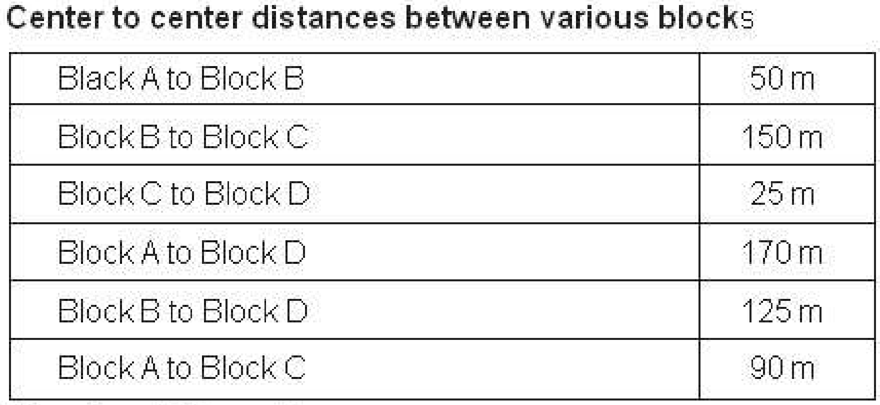
a. To display details of all the students in the descending order of their Name.
b. To print the average fee for each hobby
c. To increase the fees of Cooking by 50 Rs
d. To store the fees of hobbies as 100 where fee is not available
e. To display the name of students who were born after '01-01-2004'

OR

Explain the following functions with examples:

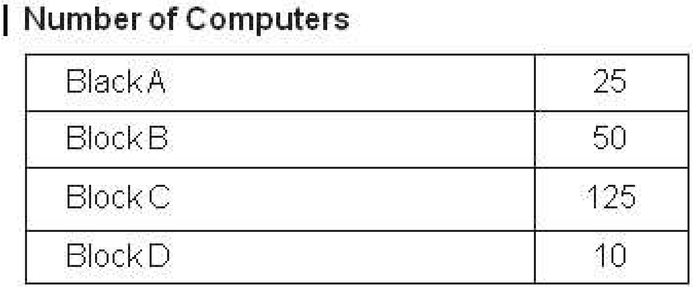
a. SUBSTRING()
b. POWER()
c. DAYNAME()
d. LTRIM()
e. LENGTH()

32 ABC company is working in 4 blocks- A, B, C and D. Following table shows the distance between blocks and the number of computers in each of the blocks. The company is planning to form a network of these blocks. 5



Center to center distances between various blocks

Black 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

Black A	25
Block B	50
Block C	125
Block D	10

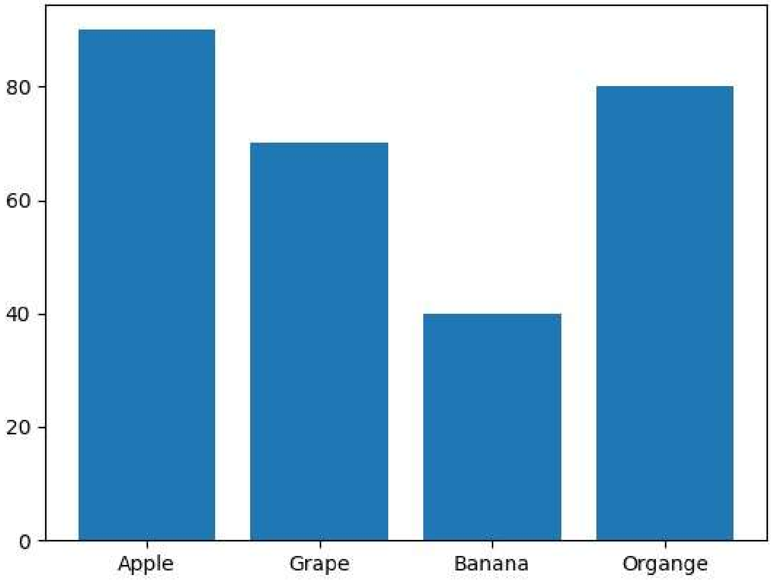
i. Suggest a cable layout of connections between the blocks.
ii. Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason.

iii. Suggest the placement of the following devices with justification
   (a) Repeater
   (b) Hub/Switch

iv. The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?

v. The organisation 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

33 Write Python code to plot a bar chart as shown below: 5



Also give suitable python statement to save this chart.

OR

Write a python program to plot a line chart based on the given data

Days=[1,2,3,4]
Wages in thousands=[40,42,38,44]

SECTION E

34 Consider the given table Result :- 1+1+2

Rollno	Name	Class	DOB	Gender	City	Marks
1	Nanda	X	12-10-1998	F	Delhi	56
2	Saurabh	XI	24-12-1994	M	Chennai	45
3	Sanal	XII	15-08-2003	M	Delhi	66
4	Rekha	X	11-09-2004	F	Mumbai	81
5	Neha	XII	05-06-2006	F	Chennai	77

i. Write SQL commands to :
ii. Display the minimum and maximum marks obtained by female students
iii. Display different Cities(without repetition) available in table
iv. Display the average mark obtained by students of each city

OR (Option for part iii only)

Display the class wise total of marks obtained by students

35 Consider the following DataFrame SPORTS

	ID	**NAME**	**GENDER**
SD1	1	ANN	F
SD2	2	RAM	M
SD3	3	SITA	F
SD4	4	RAJ	F

Write commands to : 1+1+2

I. Add a new column ‘ITEM’ to the Dataframe
II. Add a new row with values (5, SAM, M):

III. Write python code to delete column gender

OR (Option for part iii only)

Write python statement to delete the row with index SD3.

(SET I)

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION

INFORMATICS PRACTICES (065) – MARKING SCHEME

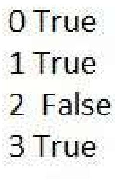
SQP Answer Key - Class XII

Max Marks: 70 **Time: 3 hrs**

<table>
<tr><td></td><td>SECTION A</td><td></td></tr>
<tr><td>1</td><td>i. Repeater
1 mark for correct answer</td><td>1</td></tr>
<tr><td>2</td><td>iv. Stealing of user name and password and misusing others Email
1 mark for correct answer</td><td>1</td></tr>
<tr><td>3</td><td>iv. Empty cola cans
1 mark for correct answer</td><td>1</td></tr>
<tr><td>4</td><td>Practices
1 mark for correct answer</td><td>1</td></tr>
<tr><td>5</td><td>i. 22
1 mark for correct answer</td><td>1</td></tr>
<tr><td>6</td><td>ii. Free
1 mark for correct answer</td><td>1</td></tr>
<tr><td>7</td><td>iii. SELECT * FROM PRODUCT ORDER BY PRICE DESC;
1 mark for correct answer</td><td>1</td></tr>
<tr><td>8</td><td>i. cardinality
1 mark for correct answer</td><td>1</td></tr>
<tr><td>9</td><td>iii. ALTER
1 mark for correct answer</td><td>1</td></tr>
<tr><td>10</td><td>ii. S.Tail(3)
1 mark for correct answer</td><td>1</td></tr>
<tr><td>11</td><td>iii. import matplotlib.pyplot as plt
1 mark for correct answer</td><td>1</td></tr>
<tr><td>12</td><td>iv. All of these
1 mark for correct answer</td><td>1</td></tr>
<tr><td>13</td><td>VoIP</td><td>1</td></tr>
<tr><td>14</td><td>199.3</td><td>1</td></tr>
<tr><td>15</td><td>ii. Dismantling
1 mark for correct answer</td><td>1</td></tr>
<tr><td>16</td><td>iii. Digital footprint
1 mark for correct answer</td><td>1</td></tr>
<tr><td>17</td><td>ii. Both A and R are true and R is not the correct explanation for A</td><td>1</td></tr>
<tr><td>18</td><td>i. Both A and R are true and R is the correct explanation for A</td><td>1</td></tr>
<tr><td></td><td>SECTION B</td><td></td></tr>
<tr><td>19</td><td><table>
<tr><td>LAN</td><td>WAN</td></tr>
<tr><td>Local Area Network</td><td>Wide Area Network</td></tr>
<tr><td>Limited to a single organization or building</td><td>Span countries and continents</td></tr>
</table></td><td>2</td></tr>
</table>

<table>
<tr><td></td><td><table><tr><td>Low cost to set up</td><td>Cost of setting up is comparatively high</td></tr><tr><td>Covers a distance of upto 1KM</td><td>Distance > 25 KM</td></tr></table>1 mark each for correct difference (two differences)
OR
a. Modem is a network device to convert analog signal to digital and vice versa
b. A firewall is a network security device that monitors traffic to or from a network. It allows or blocks traffic based on a defined set of security rules.
(1 mark for each correct answer)</td><td></td></tr>
<tr><td>20</td><td>a. SELECT LENGTH(“Happy Holidays”);
b. SELECT UPPER(“Happy Holidays”);
OR
SELECT UCASE(“Happy Holidays”);

1 mark for each correct query.</td><td>2</td></tr>
<tr><td>21</td><td><table><tr><th>DDL</th><th>DML</th></tr><tr><td>Data definition Language</td><td>Data Manipulation Language</td></tr><tr><td>DML commands are used to make modification of data inside the table</td><td>DML command modifies the structure of the database schema</td></tr><tr><td>Eg: INSERT, DELETE, UPDATE</td><td>Eg: ALTER, CREATE, DROP</td></tr></table>1 mark each for correct difference (two differences)</td><td>2</td></tr>
<tr><td>22</td><td>import pandas as pd
S1=pd.Series([76,88,60,85,81],index=['ENG','HINDI','MATH','SCI,’SST’])

1 mark for each correct python statement</td><td>2</td></tr>
<tr><td>23</td><td>Dismantling,segregation,refurbishment ,recycling ,disposal of dangerous material
½ mark for each
Or
i. No copyright violation
ii. Share the expertise with others on the internet
iii. Avoid cyber bullying
iv. Respect other’s privacy and diversity
½ mark for each net etiquette</td><td>2</td></tr>
<tr><td>24</td><td>
0 True
1 True
2 False
3 True

½ mark for each correct output</td><td>2</td></tr>
<tr><td>25</td><td>i. The index labels of df will include S1,S2,S3,S4,A,B,C
ii. The column names of df will be: 1,2
1 mark for each correct answer</td><td>2</td></tr>
</table>

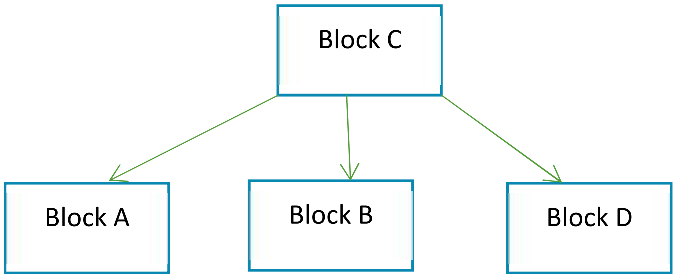
	SECTION C	

26	a.
	Coachname
	Sardar Singh
	Roshan Lal
	Rahul Dravid
	Chetan Sharma
	Deepika Kumari
	Limbaram
	b. SELECT SUM(Noofplayers) FROM SPORTS GROUP BY SportName;
	c. SELECT SportName FROM SPORTS GROUP BY SportName HAVING SUM(Noofplayers) > 25;
	1 mark for each correct answer
		3

27	import pandas as pd data=[[101,'Ram',2500],[102,'Ann',5000],[103,'Sam', 8000], [104,'Manu',4000]] df=pd.DataFrame(data,columns=['empno','Name', 'Salary']) 1 mark for each correct python statement	3
28	i) print(DF1.Infosys) or print(DF1['Infosys']) ii) print(DF1.loc['Qtr3', :]) iii) 67 1 mark for each correct statement	3
29	Legal recognition of e transaction Parliament passed law in year 2000 called IT Act Legally valid in india 1 mark for each correct answer OR 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 1 mark for correct definition 1 mark for correct justification ½ mark each for any two ways to avoid plagiarism	3
30	a. i. MONTHNAME(date) - 1 mark ii. DATE(date) - 1 mark	3

	b. i. data for all -1/2 mark ii. 6 -1/2 mark OR Where clause is used to put conditions on individual rows whereas having clause is used to put conditions on groups. HAVING is used along with GROUP BY clause (2 marks for correct answer) 1 mark for suitable example	
	SECTION D	

31	a. SELECT * FROM STUDENT ORDER BY NAME DESC;
	b. SELECT AVG(FEES), HOBBY FROM STUDENT GROUP BY HOBBY;
	c. UPDATE STUDENT SET FEES=FEES+50 WHERE HOBBY= ’Cooking’;
	d. UPDATE STUDENT SET FEES=100 WHERE FEES IS NULL;
	e. SELECT NAME FROM STUDENT WHERE DOB > ‘2004-01-01’;
	(1 mark for each correct query)
	OR
	a. SUBSTRING()- used to extract a string from a main string
	Eg: SELECT SUBSTRING(“Python program”, 2,3) ;
	will produce the output “yth”
	b. POWER()- find the value of one number raised to another
	Eg: SELECT POWER(2,3);
	will produce the output 8
	c. DAYNAME() – displays the name of day like “MONDAY, TUESDAY etc”
	Eg: SELECT DAYNAME(‘2022-09-29’); will give the output THURSDAY
	d. LTRIM() – displays the string with leading spaces removed
	Eg: SELECT LTRIM(“ hello ”);
	will produce the output “hello “
	e. LENGTH()- displays the number of characters in a string
	Eg: SELECT LENGTH(“Python Program”);
	will display 14
	(1 mark for each correct answer)
		5

32	i. 	5

	ii. Block C, since its having the highest number of computers among the blocks. According to 80-20 rule, server should be placed in the block with highest number of computers. iii. a. Block C to A, Block C to B, Block C to D – Since the distance between the blocks is greater than 80m b. Hub/Switch –should be placed in all the blocks, since the number of computers in each block is greater than 1 iv. Radio waves v. MAN , The network formed within a city is MAN (1 mark for each correct answer)	
33	import matplotlib.pyplot as plt import matplotlib.pyplot as plt x=['Apple','Grape','Banana','Organge'] y=[90,70,40,80] plt.bar(x,y) plt.ylabel('prize') plt.xlabel(Fruits’) plt.show() ½ mark for each correct statement Python statement to save the chart: plt.savefig("aa.jpg") 1 mark for the correct statement OR import matplotlib.pyplot as pltDays=[1,2,3,4] wages=[40,42,38,44] plt.plot(Days,wages) plt.show() 1 mark for each correct statement	5
	SECTION E	
34	a. SELECT MIN(MARKS), MAX(MARKS) FROM RESULT WHERE GENDER=’F’; (1 mark) b. SELECT DISTINCT(CITY) FROM RESULT; (1 mark) c. SELECT AVG(MARKS) FROM RESULT GROUP BY CITY; OR SELECT SUM(MARKS) FROM RESULT GROUP BY CLASS;(1 mark)	1+1+2
35	i. SPORTS[‘ITEM’]=[‘Swimming’, ‘Dancing ’, ‘Cricket’, ‘Singing’] ii. SPORTS.loc[‘SD5’]=[5, ‘RAM’, ‘M’] 1 mark for each iii. del SPORTS[‘GENDER’] OR SPORTS.drop(index= ‘SD3’)) 2 marks for correct Python statement	1+1+2

Index

KENDRIYA VIDYALAYA SANGATHAN ERNAKULAM REGION

INFORMATICSPRACTICES (065)

SAMPLE PAPER (2022 - 23) - Class XII – SET II

Max Marks: 70 **Time: 3 hrs**

General Instructions:

1. This question paper contains five sections, Section A to E.
2. All questions are compulsory.
3. Section A have 18 questions carrying 01 mark each.
4. Section B has 07 Very Short Answer type questions carrying 02 marks each.
6. Section C has 05 Short Answer type questions carrying 03 marks each.
7. Section D has 03 Long Answer type questions carrying 05 marks each.
8. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part C only.
9. All programming questions are to be answered using Python Language only.

	Part - A	
1	**Which of these is not a communication channel?** a) Satellite b) Microwave c) Radio wave d) Wi-Fi	1
2	The command used to show legends is ____________________ a. display() b. show() c. legend() d. legends() e.	1
3	Write the output of the following SQL command. select truncate(15.88,1); a. 15.88 b.15.8 c.15.9 d. 16	1
4	Given a Pandas series called Marks, the command which will display the last 2 rows is____________. a. print(Marks.tail(2)) b. print(Marks.Tail(2)) c. print(Marks.tails(3) d. print(Marks.tail())	1

5	If column "City" contains the data set (CHENNAI, MUMBAI, KOLKATA, CHENNAI, KOLKATA), what will be the output after the execution of the given query? SELECT COUNT(DISTINCT City) FROM Customer; i. 4 ii. 5 iii. 3 iv. 2	1
6	Which of the following is not a valid chart type? a. lineplot b. bargraph c. histogram d. statistical	1
7	Which of the following crime(s) is/are covered under cybercrime? i. Stealing brand new hard disk from a shop. ii. Getting into unknown person's social networking account and start messaging on his behalf. iii. Copying some important data from a computer without taking permission from the owner of the data. iv. Working on someone's computer with his/her permission. **(a) only (ii) (b) (ii) and (iv) (c) (ii) and (iii) (d) (iii) and (iv)**	1
8	The __________ attribute of a dataframe object returns the row labels of a dataframe. a. index b. columns c. rows d. column	1
9	Which of the following is not a network device : a. Repeater b. hub c. TCP d. switch	1
10	Website stores the browsing activity through ______________________ a. web page b. Cookies c. passwords d. server	1
11	Which of the following is not an aggregate function ? a. Avg() b. Trim() c. Min() d. Sum()	1
12	A _______ is a type of intellectual property consisting of a symbol, word, or words legally registered or established by use as representing a company or product.	1

	(a) Trademark (b) Patent (c) Copyright holder (d) Plagiarism	
13	A Dataframe object is a collection of _______________ type of data a. Homogenous b. Heterogenous c. Hybrid d.None of the above	1
14	The practice of taking confidential information from you through an original looking site and URL is known as a. hacking b. fishing c. phishing d. Eavesdropping	1
15	'F' in FOSS stands for: (a) Free (b) Forever (c) Fire (d) Freezing	1
16	Unsolicited commercial email is known as ________________ . a. Junk mail b. Spam c. Trash d. Chats	1
	Q17 and 18 are ASSERTION AND REASONING based questions. Mark the correct choice as i. Both A and R are true and R is the correct explanation for A ii. Both A and R are true and R is not the correct explanation for A iii. A is True but R is False iv. A is false but R is True	
17	**ASSERTION(A)**: The practice of taking someone else's work or ideas and passing them off as one's own **REASONING(R)**: Using graphs, charts, figures, or images without reference of source	1
18	**ASSERTION(A)**: The shape attribute returns the number of rows and number of columns available in data frame. **REASONING(R)**: The shape attribute return the values in form of list.	1
	Part - B	
19	Write an overview of Indian IT Act OR What can be done to reduce the risk of identity theft? Write any two ways.	2

20

With SQL, how can you return the number of rows not null value in the Project field of Students table

(a) SELECT COUNT(Project) FROM STUDENTS;
(b) SELECT COLUMNS(Project) FROM STUDENTS;
(c) SELECT COLUMNS(*) FROM STUDENTS;
(d) SELECT COUNT(*) FROM STUDENTS:

Write a short explanation of your answer query.

2

21

What is the difference between the group by and order by clause when used along with the select statement? Explain with an example.

2

22

Write a program in Python Pandas to create a series which stores marks of 5 subjects of a student in class 10B of your school.

Assume that student is studying class X and have 75,78,82,82,86 marks

2

23

Give any 2 solutions to manage the E-Waste in the country.

OR

List any two health hazards related to excessive use of technology

2

24

What will be the output of the following code:

```
>>>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])
```

2

25

Carefully observe the following code:

```
import pandas as pd
data = [{'a': 10, 'b': 20},{'a': 6, 'b': 32, 'c': 22}]
df1 = pd.DataFrame(data)
print(df1)
```

Answer the following:

i. List the index of the DataFrame df1
ii. List the column names of DataFrame df1.

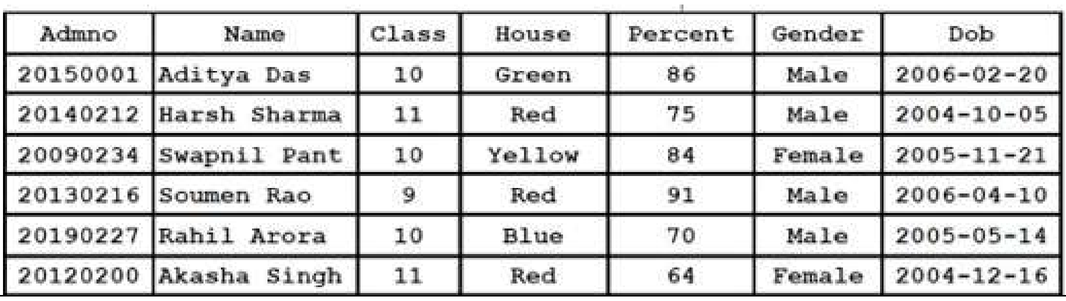
2

Section C

26

Ms Malini is working in a school and stores the details of all students in a table SCHOOLDATA.

TABLE : SCHOOLDATA



Admno	Name	Class	House	Percent	Gender	Dob
20150001	Aditya Das	10	Green	86	Male	2006-02-20
20140212	Harsh Sharma	11	Red	75	Male	2004-10-05
20090234	Swapnil Pant	10	Yellow	84	Female	2005-11-21
20130216	Soumen Rao	9	Red	91	Male	2006-04-10
20190227	Rahil Arora	10	Blue	70	Male	2005-05-14
20120200	Akasha Singh	11	Red	64	Female	2004-12-16

3

Find the ouput :

i. SELECT LENGTH(NAME) FROM SCHOOLDATA WHERE HOUSE=’Red’;
ii. SELECT LEFT (Gender, 1), Name FROM SCHOOLDATA WHERE YEAR (Dob) = 2005;
iii. SELECT MID(UPPER(NAME),5,4) FROM SCHOOLDATA WHERE GENDER = ’Male’;

27 Write a Python code to create a DataFrame with appropriate column headings from the list given below:

[[‘Nidhi’,’Business Studies’,95],[‘Gurjeet’,’Informatics Practices’,97],
[‘Pahul’,’Accountancy’,88], [‘Divya’,’English’,72]]

3

28 Consider the given DataFrame shop

	APPLIANCE_NAME	DISCOUNT	PRICE
0	REFRIGERATOR	15	19800
1	SMART PHONE	20	22300
2	TELEVISION	22	12900
3	AIR CONDITIONER	15	23500
4	WASHING MACHINE	18	18900
5	WASHING MACHINE	15	20110

Write the commands for the following:

i. Add a column called Special_Quantity with the following data:
[62,26,12,32,48,52,35].
ii. Add a new Electronics item named ’TELEVISION’,12 having price 35600.
iii. Remove the column Special_Quantity.

3

29 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.

i. What is this happening to Sutapa?
ii. What immediate action should she take to handle it?
iii. Is there any law in India to handle such issues? Discuss briefly.

OR

What do you understand by hacking? Why is it a punishable offence? Mention any two ways to avoid hacking.

3

30 Based on table **SCHOOL** given here, write suitable SQL queries for the following:

CODE	TEACHERNAME	SUBJECT	Category	DOJ	PDS	EXP
1001	RAVI SHANKAR	ENGLISH	PGT	12/03/2000	24	10
1009	PRIYA RAI	PHYSICS	TGT	03/09/1998	26	12
1203	LISA ANAND	ENGLISH	TGT	09/04/2000	27	5
1045	YASHRAJ	MATHS	PGT	24/08/2000	24	15
1123	GANAN	PHYSICS	TGT	16/07/1999	28	3
1167	HARISH B	CHEMISTRY	PGT	19/10/1999	27	5
1215	UMESH	PHYSICS	TGT	11/05/1998	22	16

i. Display subject wise highest experience.

3

ii. Display category wise lowest experience.
iii. Display total number of PGT and TGT teachers

OR

Briefly explain the difference between count() and count(*) with the help of an example.

Section D

31 Write the names of SQL functions which will perform the following operations:

i) To display the current date
ii) To convert the string in capital letters 'Kendriya'
iii) To remove spaces from the end of string "Good Morning"
iv) To display the month from the current date
v) To compute the power of a number n1 raised to the power n2

OR

Consider the following tables STATIONERY and answer the questions:

Table: STATIONERY

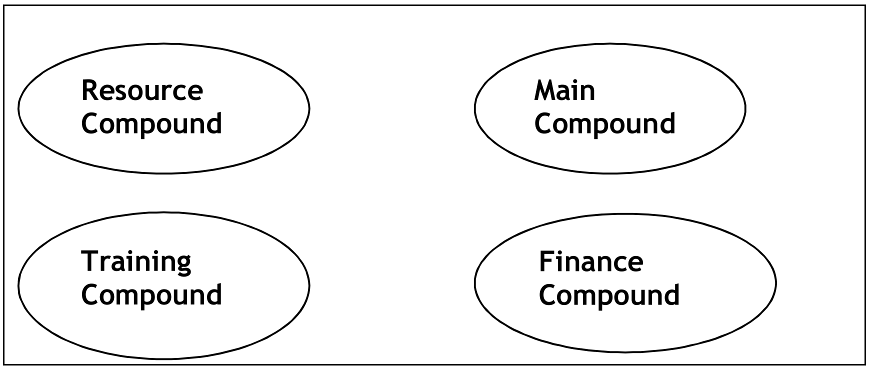
S_**ID**	**Stationery Name**	**Company**	**Price**
DP01	Dot Pen	ABC	10.50
PL02	Pencil	XYZ	6.00
ER05	Eraser	XYZ	7.50
PL01	Pencil	CAM	5.75
GP02	Gel Pen	ABC	15.00

Write SQL commands using SQL functions to perform the following operations:

i) Display the stationary name and price after rounding off to zero decimal places.
ii) Display the occurrence of 'en' in stationary name.
iii) Display the first four characters of the stationary name.
iv) Display the names of company after converting to lower case.
v) Display the length of stationary names

5

32 "Learn Together" is an educational NGO. It is setting up its new campus at Jaipur for its web based activities. The campus has 4 compounds as shown in the diagram below:



5

Center to center distances between various Compounds as per architectural drawings (in Metre) is as follows :

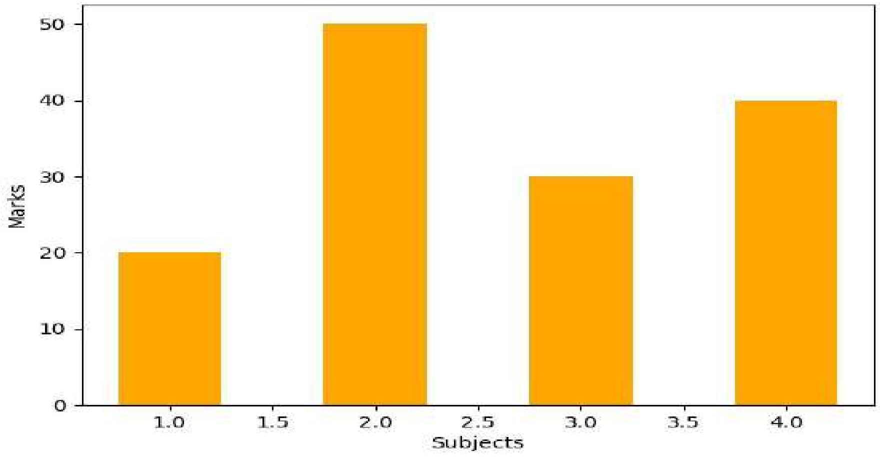
Main Compound to Resource Compound	110 m
Main Compound to Training Compound	115 m
Main Compound to Finance Compound	35 m
Resource Compound to Training Compound	25 m
Resource Compound to Finance Compound	135 m
Training Compound to Finance Compound	100 m

Expected Number of Computers in each Compound is as follows:

Main Compound	5
Resource Compound	15
Training Compound	150
Accounts Compound	20

1. Suggest a cable layout of connections between the compounds.
2. Suggest the most suitable topology of the connection between the wings.
3. Suggest the most suitable place (i.e. compound) to house the server for this NGO. Also, provide a suitable reason for your suggestion.
4. Suggest the placement of the following devices with Justification :
   (i) Repeater
   (ii) Hub/Switch
5. The NGO is planning to connect its International office situated in Mumbai, which out of the following wired communication link, you will suggest for a very high speed connectivity?
   (i) Telephone Analog Line
   (ii) Optical Fiber
   (iii) Ethernet Cable

33 Consider the following graph .Write the code to plot it.



Also give suitable python statement to save this chart.

OR

5

Write a python program to plot a line chart based on the given data to depict the changing medal tally between four Houses in school.

House=['Varun', 'Prithvi', 'Agni', 'Trishul']
medal=[50,70,90,110]

SECTION E

34 Mukund, a database administrator has designed a database for a clothing sports club. Help him by writing answers of the following questions based on the given table: 1+1+2

Consider the table SPORTS and give the output for the following queries:

StudentNo	**Class**	**Name**	**Game**	**Grade**
10	7	Sammer	Cricket	B
11	8	Sujit	Tennis	A
12	7	Kamal	Swimming	B
13	7	Venna	Tennis	C
14	9	Archana	Basketball	A
15	10	Arpit	Cricket	A

i. Write a query to display Game in lower case.
ii. Write a query to display the lowest class of the sports club.
iii. Write a query to count total number of Games with grade A.
OR (Option for part iii only)
Write a query to count class wise total number of games played

35 Mr. Ravi, a data analyst has designed the DataFrame **df** that contains data about Car Sales with 'T1', 'T2', 'T3', 'T4', 'T5' as indexes shown below. Answer the following questions: 1+1+2

	Col1	**Col2**	**Col3**	**Res**
T1	62.893165	100.0	60.00	True
T2	94.734483	100.0	59.22	True
T3	49.090140	100.0	46.04	False
T4	38.487265	85.4	58.60	False

A. Predict the output of the following python statement:
i. df.shape
ii. df[1:3]
B. Write Python statement to display the data of Col3 column of indexes T2 to T4.
OR (Option for part B only)
Write Python statement to compute and display the difference of data of Col2 column and Col3 column of the above given Data Frame.

KENDRIYA VIDYALAYA SANGATHAN ERNAKULAM REGION
CLASS XII - INFORMATICS PRACTICES (065)
SAMPLE PAPER – II MARKING SCHEME

Max Marks: 70 **Time: 3 hrs**

Q No	PART – A	Marks
1.	d) Wi-Fi	**1**
2.	c. legend()	**1**
3.	b. 15.8	**1**
4.	a. print(Marks.tail(2))	**1**
5.	iii. 3	**1**
6.	d. statistical	**1**
7.	**(c) (ii) and (iii)**	**1**
8.	c)index	**1**
9.	c)TCP	**1**
10.	b)Cookies	**1**
11.	b) Trim()	**1**
12	a) Trademark	**1**
13.	b)Heterogenous	**1**
14.	c)Phishing	**1**
15.	a) Free	**1**
16.	b) Spam	**1**
17.	i. Both A and R are true and R is the correct explanation for A	**1**
18.	iii. A is True but R is False	**1**
	Section-B	
19.	The Information Technology Act of 2000 came into force on October 17, 2000. This act isimposed upon the whole of India. Its provisions apply to any offense committed inside or outside India's geographic boundaries and irrespective of nationality. The act covers offenses involving computers, computer systems, or computer networks in India. It also makes acts like hacking, data theft, spreading of computer viruses, identity theft,defamation (sending offensive messages), pornography, child pornography, and cyber terrorism criminal offenses.	**2**

Or

Always use strong passwords at least eight characters long that have numbers and special characters (like: $, %, &), and that do not contain a word found in the dictionary. Change yourpasswords frequently and never share them.

Avoid using software downloaded from unknown websites or peer-to-peer file sharing services. Avoid software that claims to be game, a screensaver, collect information for "marketing purposes" or promises to "accelerate your internet connections." These are actuallyprograms that can include spyware.

20. a. SELECT COUNT(Project) FROM STUDENTS;
count ignores null values while counting the values in its argument column

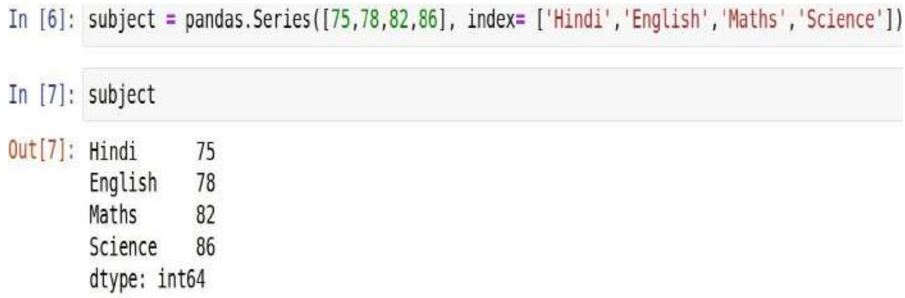
2

21.

Group By	Order By
It is used to divide the table into logical groups	It sorts the result set either in ascending or descending order
Logical grouping is done based on the similarity among the row's attribute values.	result-set is sorted based on the column's attribute values, either ascending or descending order.
Select brand, count(*) from appliances group by Brand	Select * from appliances order by discount asc;

2

22.



```
In [6]: subject = pandas.Series([75,78,82,86], index= ['Hindi','English','Maths','Science'])

In [7]: subject

Out[7]: Hindi      75
        English    78
        Maths      82
        Science    86
        dtype: int64
```

2

23.

i. Give Your Electronic Waste to a Certified E-Waste Recycler
ii. Donating Your Outdated Technology
iii. Give Back to Your Electronic Companies and Drop Off Point

Or

The continuous use of devices like smartphones, computer desktop, laptops, head phones 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

2

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.

iii. Impact on eyes: This is the most common form of health hazard as prolonged hours of screen time can lead to extreme strain in the eyes.

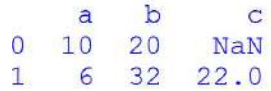
iv. Sleep problem: Bright light from computer devices block a hormone called melatonin which helps us sleep. Thus, we can experience sleep disorders leading to short sleep cycles

Write any Two

24. (**2**)

```
2    86
5    98
dtype: int64
```

25. (**2**)



```
     a   b     c
0   10  20   NaN
1    6  32  22.0
```

```
i.      0
        1
ii.     a   b   c
```

Section - C

26. (**3**)

```
i)      LENGTH(NAME)
          12
          10
          12
ii)     LEFT (Gender, 1)          Name
            F                   Swapnil Pant
           M                     Rahil Arora
iii)     MID(UPPER(NAME),5,4)
                  A  DA
                  SHA
                  N RA
                  A SI
```

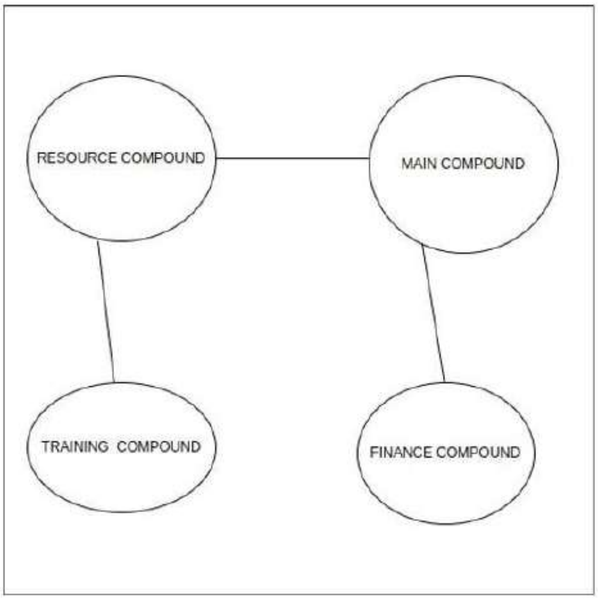
27. (**3**)

```
import pandas as pd
data=[['Nidhi','Business Studies',95],['Gurjeet','Informatics Practices',97],
           ['Pahul','Accountancy',88],['Divya','English',72]]
df=pd.DataFrame(data,columns=['name','subject','marks'])
 print (df)
```

<table>
<tr><td>28</td><td>i. stock['Special_quantity']=[[62,26,12,32,48,52,35]]
ii. stock.loc['6']=[’TELEVISION’,12, 35600]
iii. stock=stock.drop('Special_quantity',axis=1)</td><td>3</td></tr>
<tr><td>29</td><td>Hacking is the act of compromising digital devices and networks through unauthorized access to an account or computer system.
Hacking is not always a malicious act, but it is most commonly associated with illegal activity and data theft by cyber criminals.
Ways to avoid Hacking:
Use two-factor authentication.
Make sure you're on an official website when entering passwords.</td><td>3</td></tr>
<tr><td>30</td><td>i. select max(exp) from school group by subject;
ii. select min(exp) from school group by category;
iii. select category,count(category) from school group by category;
1 mark for each correct query
OR
<table>
<tr><td>Count(*)</td><td>Count( )</td></tr>
<tr><td>Is used to count the number of rows in query</td><td>Is used to count the values present in any column excluding NULL values</td></tr>
</table>
Consider the table SPORTS
<table>
<tr><th>S_Id</th><th>Name</th></tr>
<tr><td>SW01</td><td>NULL</td></tr>
<tr><td>SB02</td><td>Football</td></tr>
<tr><td>SB03</td><td>Hockey</td></tr>
<tr><td>SW04</td><td>Swimming</td></tr>
</table>
Select count(*) from sports;
Output : 4
Select count(Name) from sports;
Output : 3
Here the second output is 3 because Name column contain a NULL value
1 mark for correct significance</td><td>3</td></tr>
</table>

	2 marks for correct example	
	SECTION D	

31	i. select CURDATE();
	ii. select UCASE('Kendriya')
	iii. select rtrim("Good Morning ");
	iv. select month(curdate());
	v. select power(n1,n2);
	OR
	i. select stationaryname, ROUND(price) from stationary;
	ii. select INSTR(stationaryname, 'en') from stationary;
	iii. select LEFT(stationaryname, 4) from stationary;
	iv. select LCASE(company) from stationary;
	select LEN(stationaryname) from stationary;
		5

32	 RESOURCE COMPOUND MAIN COMPOUND TRAINING COMPOUND FINANCE COMPOUND e1. e2. Bus topology e3. Training compound. e4. i. Repeater to be connected between Resource compound and Main compound as thedistance is more than 70m. ii. Hub/Switch to be connected in every compound to network computers. e5. ii. Optical Fiber	**5**
33	import matplotlib.pyplot as plt x = [1, 2, 3, 4] h = [20, 50, 30, 40] plt.xlabel('Subjects') plt.ylabel('Marks') plt.bar(x, h, width=0.5) plt.show() plt.savefig("bar.png") **or**	**5**

```
import matplotlib.pyplot as plt
house=['Varun', 'Prithvi', 'Agni', 'Trishul']
medal=[50,70,90,110]
plt.plot(house,medal)
plt.show()
```

SECTION E

34

i. Select lower(Game) from sports;
ii. Select min(Class) from sports ;
1 mark for each correct query
iii. Select count(class) from sports group by game having grade='A'
OR
Select Class ,count(Game) from sports group by Game;
2 marks for correct query

1+1+2

35

A.
Output:

i. (4,4)
ii.

	Col1	**Col2**	**Col3**	**Res**
T2	94.734483	100.0	59.22	True
T3	49.090140	100.0	46.04	False

1 mark for each correct query

B. Python statement:
print(df.loc['T2': 'T4', 'Col3'])
OR
print(df.Col2 - df.Col3)
2 marks for correct Python statement

1+1+2

Index

SET III

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION
INFORMATICS PRACTICES (065)
SAMPLE QUESTION PAPER - (2022 - 23)
Class XII

Max Marks: 70 **Time: 3 hrs**

	General Instructions: 1. This question paper contains five sections, Section A to E. 2. All questions are compulsory. 3. Section A have 18 questions carrying 01 mark each. 4. Section B has 07 Very Short Answer type questions carrying 02 marks each. 5. Section C has 05 Short Answer type questions carrying 03 marks each. 6. Section D has 03 Long Answer type questions carrying 05 marks each. 7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part C only. 8. All programming questions are to be answered using Python Language only.	
	PART A	
1	Given a Pandas series called S, the command which will display the last 4 rows is ________. a. print(S.tail(4)) b. print(s.Tail()) c. print(s.tails(4)) d. print(s.tail(4))	1
2	___________ are messages that a web server transmits to a web browser so that the web server can keep track of the user's activity on a specific website. a. text b. cookies c. email d. chat	1
3	The trim()function in MySql is an example of____________________________. a. Math function b. Text function c. Date Function d. Aggregate Function	1
4	The____command can be used to insert a new row in a table in SQL. a. add() b. append c. insert into d. alter table.	1
5	State whether True or False : i. Copying and pasting data from internet or other digital resources is ethical. ii. E-waste is very hazardous if not handled carefully.	1
6	Rohan wants to print the row labels of the dataframe. He should use the ______________ attribute of a dataframe.	1

	a. column b. columns c. index d. rowname	
7	Write the output of the following SQL command. select pow(2,–2); a. -4 b. 4 c. 0.25 d. -0.25	1
8	**What is e-waste?** (a) electronic waste (b) environmental waste (c) earth waste (d) energy waste	1
9	What will be the output of the following code? mysql>> lcase ('INFORMATICS PRACTICES CLASS 12TH');	1
10	Which of these is not an example of unguided media? (i) Optical Fibre Cable (ii) Radio wave (iii) Bluetooth (iv) Satellite	1
11	Stealing someone's intellectual work and representing it as your own is known as _____. a. Phishing b. Spamming c. plagiarism d. hacking	1
12	Which of the following is not the correct aggregate functions in SQL. (a) AVERAGE() (b) MAX() (c) COUNT() (d) TOTAL()	1
13	A URL can specify the IP address of the Web ____________ that houses a Web page? a) server b) client c) e-mail recipient d) None	1
14	………………. are the records and traces that are left behind while internet is used. a) Digital data b) Digital Footprint c) Data Protection d) Plagiarism	1
15	To mention conditions along with group by function …………………clause is used. a)Where b)having c)distinct d)select	1
16	Jhilmalini has stolen a credit card. She used that credit card to purchase a laptop. What type of offence has she committed? a. online fraud b. cyber bullying	1

c. cyber stalking
d. All of the above.

Q17 and 18 are **ASSERTION AND REASONING** based questions. Mark the correct choice as

i. Both A and R are true and R is the correct explanation for A
ii. Both A and R are true and R is not the correct explanation for A
iii. A is True but R is False
iv. A is false but R is True

17 **Assertion (A)** : import matplotliblib.pyplot as plt is used to import pyplot .
Reason (R) :It is python library so it is imported for using its function.

18 **Assertion (A):-** Series store data row wise.
Reasoning (R): - A Series is a one-dimensional labelled data structure.

SECTION B

19 Consider a given Series , T1: 2

```
SUB1     45
SUB2     65
SUB3     24
SUB4     89
```

Write a program in Python Pandas to create the series.

OR

Define Series. Write a python statement to create an empty statement.

20 Rohit writes the following commands with respect to a table student having fields, Sno, name, Age, fee. 2
Command1 : Select count(*) from student;
Command2: Select count(name) from employee;
he gets the output as 6 for the first command but gets an output 5 for the second command. Explain the output with justification.

21 Consider the following Series object, C_amt 2

Mouse	135
Keyboard	260
Pen drive	80
CD	155

i. Write the command which will display the name of the items having amount <100.
ii. Write the command to name the series as comp_items.

22 Consider the following DataFrame, Student 2

	Rollno	Name	Class	Section	Marks	Stream
S1	1	Sheetal	XI	A	87	Science
S2	2	Preet	XI	B	89	Arts
S3	3	Kartik	XI	A	92	Science
S4	4	Laksh	XI	A	94	Commerce

Write commands to :

i. Add a new column ‘Percentage’ to the Data frame.
ii. Add a new row with values (5 , Rohit ,XI, A ,98,Science)

23 Expand the following terms related to Computer Networks: 2
a. HTTP
b. POP3
c. FTP
d.VoIP

OR

Differentiate between static and dynamic web pages.

24 Consider the following SQL string: “Computer” 2
Write commands to display:
a. “mputer”
b. “ut”

OR

Considering the same string “Computer”
Write SQL commands to display:
a. The position of the substring ‘ter’ in the string “Computer”.
b.The first 5 letters of the string.

25 List any two health problems related to excessive use of Technology. 2

SECTION C

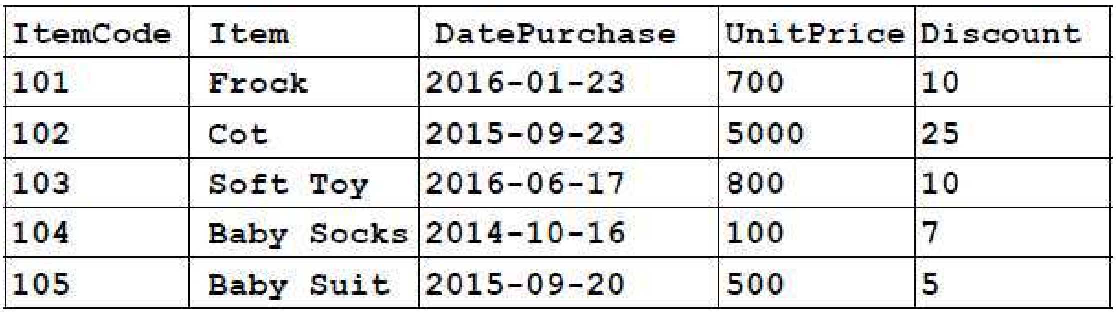
26 Cconsider two objects s and t. s is a list whereas t is a Series. Both have values 20, 40, 90, 110. 3
What will be the output of the following two statements considering that the above objects have been created already

a. print (s*2) b. print(t*2)

Justify your answer.

27 Consider the Table “Infant” shown below. 3

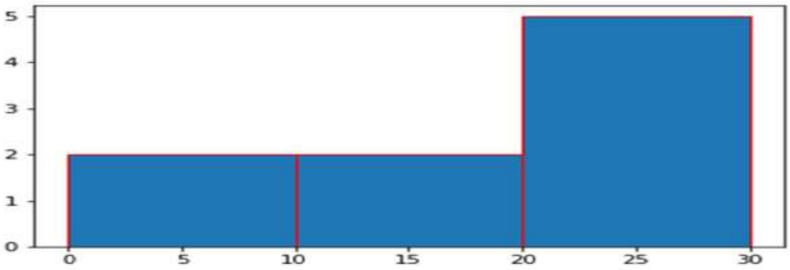
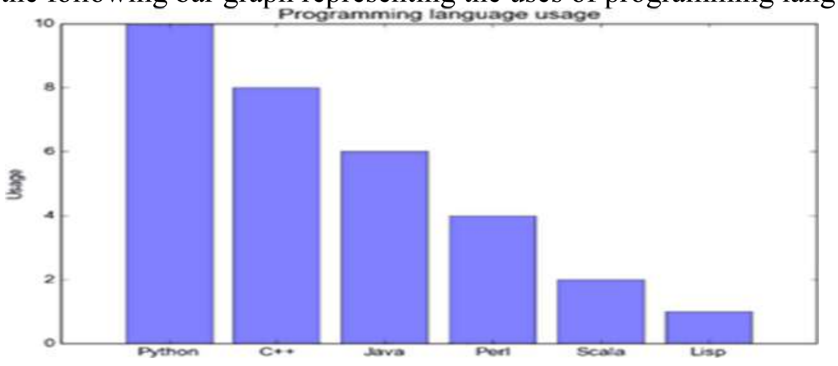
Table: Infant



ItemCode	Item	DatePurchase	UnitPrice	Discount
101	Frock	2016-01-23	700	10
102	Cot	2015-09-23	5000	25
103	Soft Toy	2016-06-17	800	10
104	Baby Socks	2014-10-16	100	7
105	Baby Suit	2015-09-20	500	5

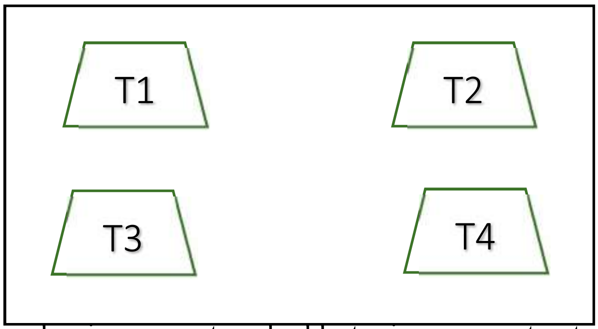
NOTE: Discount column stores discount %.
Write SQLcommands to:
a. To displays the number of items that have more than 10% as discount.
b. To display the highest unit price of items.
c. To display the names of items that has ‘Baby’ anywhere in their item names.

28 Write a Python code to create a DataFrame with appropriate column headings from the list 3

	given below: [[21101,'MANJUSH',58],[21102,'AKSHAY',60],[21103,'ANN' ,76], [21104,'NITHYA',48]]	
29	What are the different ways in which authentication of a person can be performed? **OR** Describe measures to recycle your e-waste.	3
30	Predict the output of the following queries: I) SELECT INSTR (‘Very good’, 'good'); II) SELECT MID('Quadratically',5,6); III) SELECT RIGHT (‘Command', 3); **OR** Explain the following SQL functions using suitable examples. a) INSTR() b) MID() c) RIGHT()	3
	SECTION D	
31	Consider the following graph. Write the code to plot it.  **OR** Draw the following bar graph representing the uses of programming language. 	5
32	A company AST Enterprises has 4 wings of buildings as shown in the diagram : Center to center distances between various Buildings: T3 to T1 - 50m T1 to T2 - 60m T2 to T4 - 25m T4 to T3 - 170m T3 to T2 - 125m	5

T1 to T4 - 90m

Number of computers in each of the wing:
T1 - 140
T2 - 15
T3 - 15
T4 - 25



Computers in each wing are networked but wings are not networked The company has now decided to connect the wings also.

i. Suggest a most suitable cable layout for the above connections.
ii. Suggest the most appropriate topology of the connection between the wings.
iii. The company wants internet accessibility in all the wings. Suggest a suitable technology.
iv. Suggest the placement of the following devices with justification if the company wants minimized network traffic
   a) Repeater b)Hub / switch
v. The company is planning to link its head office situated in Pune with the offices in hilly areas. Suggest a way to connect it economically.

33 Write the SQL functions which will perform the following operations: 5

i) To display the current date .
ii) To display the substring “earn” from the whole string ‘LearningIsFun’.
iii) To round the number 76.384 up to 2 place after decimal point.
iv) To find the position of first occurrence of ‘R’ in string 'INFORMATION FORM'
v) To find out the result of 9^3 .

OR

Consider a table Order with the following data:

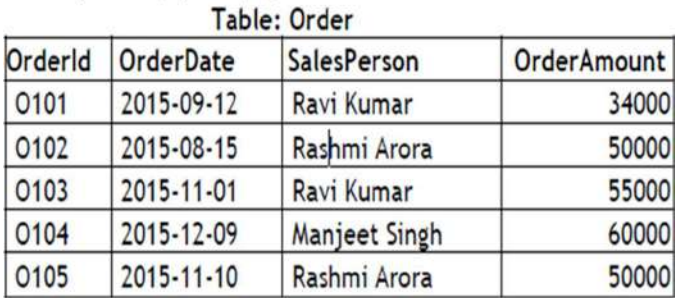


Table: Order

OrderId	OrderDate	SalesPerson	OrderAmount
0101	2015-09-12	Ravi Kumar	34000
0102	2015-08-15	Rashmi Arora	50000
0103	2015-11-01	Ravi Kumar	55000
0104	2015-12-09	Manjeet Singh	60000
0105	2015-11-10	Rashmi Arora	50000

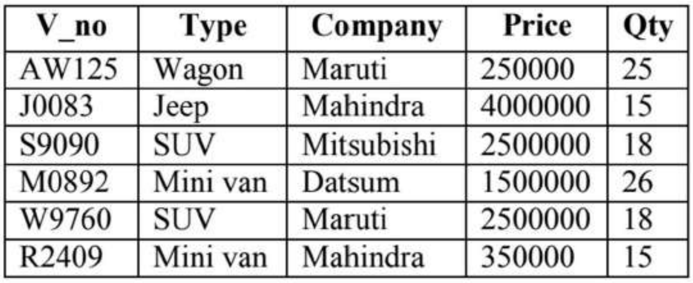
Write SQL queries using SQL functions to perform the following operations:

i) To count the number of orders booked by Salespersons with names starting with ‘R’.
ii) Display the position of occurrence of the string “an” in SalesPerson names.
iii) Display the four characters from SalesPerson name starting from second character.

iv) To find the average of order amount.
v) Display the month name for the Order date.

SECTION E

34 A relation Vehicles is given below: 1+1+2



V_no	Type	Company	Price	Qty
AW125	Wagon	Maruti	250000	25
J0083	Jeep	Mahindra	4000000	15
S9090	SUV	Mitsubishi	2500000	18
M0892	Mini van	Datsum	1500000	26
W9760	SUV	Maruti	2500000	18
R2409	Mini van	Mahindra	350000	15

Write SQL commands to:

a. Count the type of vehicles manufactured by each company.
b. Display the total price of all the types of vehicles.
c. Display the average price of each type of vehicle having quantity more than 20.

OR (Option for part iii only)

Write a query to display type and price * quantity with title TOTAL PRICE company wise

35 A dataframe fdf stores data about passengers, Flights and Years as given below. 2+1+1

S_NO	Year	Months	MalePassengers	FemalePassengers
1	2009	January	90	30
2	2009	February	100	18
3	2009	March	98	22
4	2009	April	110	30

1) Write python code to create the dataframe.

Perform the following operations on the DataFrame :

2) Add both the male and female passengers and assign to column “Total_ passengers”
3) Display the maximum passengers in male passengers and maximum passengers in female passengers of the Data Frame.

OR (Option for part iii only)

Predict the output of the following python statement:

fdf.loc[:,’year’:’MalePassengers’]

SET-III

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION

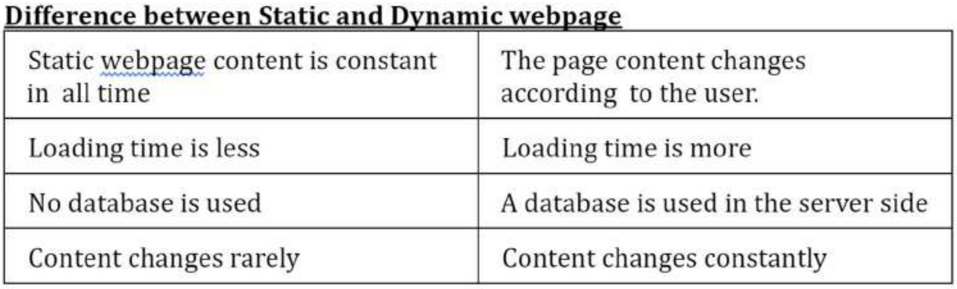
INFORMATICS PRACTICES (065) SAMPLE QUESTION PAPER (2022 - 23)

Class XII - Marking Scheme

Max. Marks: 70 **Time: 3 hours**

QNo..	Section A	Total
1	print(S.tail(4)) 1 mark for the correct usage of tail()	1
2	Cookies 1 mark for the correct answer	1
3	Text function 1 mark for the correct answer	1
4	Insert into 1 mark for the correct answer	1
5	**i. False** **ii. True** **½ mark for each correct answer**	1
6	Index 1 mark for the correct answer	1
7	0.25 1 mark for the correct answer	1
8	electronic waste 1 mark for the correct answer	1
9	informatics practices class 12th 1 mark for the correct answer	1
10	Optical Fibre Cable 1 mark for the correct answer	1
11	Plagiarism 1 mark for the correct answer	1
12	TOTAL() 1 mark for the correct answer	1
13	server 1 mark for the correct answer	1
14	digital Footprint 1 mark for the correct answer	1
15	Having 1 mark for the correct answer	1
16	She has committed a fraud 1 mark for the correct answer	1
17	i.Both A and R are true and R is the correct explanation for A	1

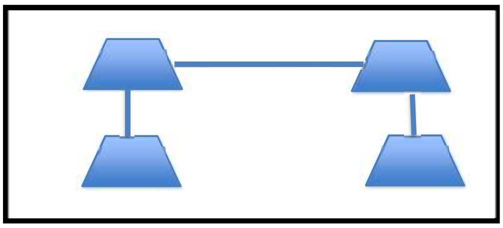
<table>
<tr><td>18</td><td>iv. A is false but R is True</td><td>1</td></tr>
<tr><td></td><td>**Section B**</td><td></td></tr>
<tr><td>19</td><td>import pandas as pd
T1=pd.Series([45,65,24,89],index=['SUB1','SUB2','SUB3','SUB4'])
½ mark for import statement
½ mark for usage of Series ()
½ mark for stating index as a list
½ mark for creating object T1</td><td>2</td></tr>
<tr><td>20</td><td>This is because the column name contains a NULL value and the aggregate functions do not take into account NULL values. Thus Command1 returns the total number of records in the table whereas Command2 returns the total number of non NULL values in the column name.</td><td>2</td></tr>
<tr><td>21</td><td>**i. print(C_amt [C_amt <100])**
ii. C_amt.name=' comp_items '
1 mark each for correct answer of part (i) , (ii)</td><td>2</td></tr>
<tr><td>22</td><td>i. classframe[‘Percentage’]=[87,89,92,94]
ii. classframe.loc[‘t5’]=[5,’ROHIT’, ‘XI’, ‘A’, 98, ‘Science’]
1 mark for each correct answer</td><td>2</td></tr>
<tr><td>23</td><td>a. HTTP: **H**yper **T**ext **T**ransfer **P**rotocol
b. POP: Point to Point Protocol
c. FTP: File Transfer Protocol
d. VoIP: Voice over Internet Protocol
½ marks for each correct full form

Or

Difference between Static and Dynamic webpage
<table>
<tr><td>Static webpage content is constant in all time</td><td>The page content changes according to the user.</td></tr>
<tr><td>Loading time is less</td><td>Loading time is more</td></tr>
<tr><td>No database is used</td><td>A database is used in the server side</td></tr>
<tr><td>Content changes rarely</td><td>Content changes constantly</td></tr>
</table></td><td>2</td></tr>
<tr><td>24</td><td>I.
1. a. select substr("Computer", 3);
1. b. select substr("Computer",5,2);
OR
2. a. select instr ('Computer' , 'ter');
2. b. select left ('Computer',5);
1 mark for each correct /similar answer (of part (a) , (b))</td><td>2</td></tr>
<tr><td>25</td><td>The continuous use of devices like smartphones, computer desktop, laptops, head phones 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</td><td>2</td></tr>
</table>

	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. iii. Impact on eyes: This is the most common form of health hazard as prolonged hours of screen time can lead to extreme strain in the eyes. **iv.** Sleep problem: Bright light from computer devices block a hormone called melatonin which helps us sleep. Thus we can experience sleep disorders leading to short sleep cycles. 2 marks for any two correct points	
	SECTION C	
26	a. will give the output as: [20,40,90,110,20,40,90,110] b. will give the output as 0 40 1 80 2 180 3 220 Justification: In the first statement s represents a list so when a list is multiplied by a number, it is replicated that many number of times. The second t represents a series. When a series is multiplied by a value, then each element of the series is multiplied by that number. 1 mark for output of list multiplication 1 mark for output of Series multiplication 1 mark for the justification	3

27	a. SELECT COUNT(Item) FROM Infant WHERE Discount > 10;
	b. SELECT MAX(UnitPrice) FROM Infant;
	c. SELECT Item FROM Infant WHERE Item LIKE ‘%Baby%’;
	1 mark for each correct query
		3

28	import pandas as pd data=[[21101,'MANJUSH',58],[21102,'AKSHAY',60],[21103,'ANN' ,76],[21104,'NITHYA',48]] df=pd.DataFrame(data,columns=['Rno','Name', 'Marks']) 1 mark for each correct python statement	3
29	Diff. methods of user identification are: a. Password b. Token c. Biometrics d. OTP OR Following measures can be adopted to recycle the e-waste safelya. Use a certified e-waste recycler.	3

	b. Visit civic institutions. c. Explore retail options. d. Donate your electronics. 3 marks for correct measures and its explaination.	
30	IV) 6 V) Ratica VI) and **OR** 1 mark for each correct explanation of functions.	3
	Section D	
31	import numpy as np import matplotlib.pyplot as plt marks=[8,9,18,16,29,28,27,26,30] plt.hist(marks,bins=[0,10,20,30],edgecolor="red") plt.savefig("hist.png") plt.show() **1 mark for the import statement** **1 mark for appropriate usage of hist() 1 mark for show()** **OR** import matplotlib.pyplot as plt; import numpy as np objects = ('Python', 'C++', 'Java', 'Perl', 'Scala', 'Lisp') y_pos = np.arange(len(objects)) performance = [10,8,6,4,2,1] plt.bar(y_pos, performance, align='center') plt.xticks(y_pos, objects) plt.ylabel('Usage') plt.title('Programming language usage') plt.show() **1 mark for the import statement** **1 mark for appropriate usage of bar()** **1 mark for show()**.	5
32	i) Most suitable layout according to distance is :  1 mark for an appropriate cable layout ii) Star Topology 1 mark for correct topology	5

	iii) Broadband. 1 mark for suggesting suitable technology iv). a. Not required. Repeaters may be skipped as per above layout (because distance is less than 100 m) b. In every wing ½ mark for placement of repeater ½ mark for placement of hub / switch v) Radio Waves 1 mark for the appropriate connectivity mode between HQ and other offices	
33	(i) SELECT SYSDATE(); (ii) SELECT MID('LearningIsFun',2,4); (iii) SELECT ROUND(76.384,2); (iv) SELECT INSTR('INFORMATION FORM','RM'); (v) SELECT POW(9,3); 1 mark for each correct answer **OR** (i) SELECT COUNT (*) FROM Order WHERE SalesPerson LIKE "R%"; (ii) Select instr(Salesperson, "an") from order; (iii) Select mid(Salesperson,2,4) from order; (iv) Select avg(OrderAmount) from order. (v) Select dayname(OrderDate) from order; 1 mark for each correct answer	5
	SECTION E	

34	a) select Company, count(distinct Type) from Vehicle group by Company;
	b) Select Type, sum(Price* Qty) from Vehicle group by Type;
	c) select Type, avg(Price) from Vehicle group by Type having Qty>20;
	OR (Option for part iii only)
	Select type,price*quantity as 'TOTAL PRICE' from vehicles group by company.
		1+1+2

35	1)	1+1+2

```
1)  import pandas as pd d1={'S_NO':[1,2,3,4],
    'Year':[2009,2009,2009,2009,2009],
    'Month':['January','February','March','April'],
    'MalePassengers'  ':[90,100,98,110],
    'FemalePassengers  ':[30,18,22,30]
    }
  fdf=pd.DataFrame(d1)
   print(df)
```

```
2) df[' Total_ passengers’]=df['MalePassengers ']+ df[' FemalePassengers ']
   print(df)
```

```
3) print("Maximum Passengers  are : " , max(df[' MalePassengers ']), max(df['
FemalePassengers ']))
```

1 mark for import statement
2 marks for creating the dataframe
1 mark for creating column Total_ passengers’ to hold the sum of male and female passengers.
1 mark for displaying maximum in male passengers & Female passengers.

OR (Option for part iii only)

```
ii fdf.loc[:,’year’:’MalePassengers’]
S_NO    Year      Months      MalePassengers
1      2009       January          90
2      2009       February        100
3      2009         March           98
4      2009          April         110
```

Index

SET - IV

CBSE SAMPLE QUESTION PAPER CLASS XII
INFORMATICS PRACTICES (065)

TIME: 3 HOURS M.M.70

General Instructions:

1. This question paper contains five sections, Section A to E.
2. All questions are compulsory.
3. Section A have 18 questions carrying 01 mark each.
4. Section B has 07 Very Short Answer type questions carrying 02 marks each.
5. Section C has 05 Short Answer type questions carrying 03 marks each.
6. Section D has 03 Long Answer type questions carrying 05 marks each.
7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part c only.
8. All programming questions are to be answered using Python Language only.

	PART A	
1.	Television cable network is an example of: i. LAN ii. WAN iii. MAN iv. Internet	1
2.	Which of the following is not a type of cyber crime? i. Data theft ii. Installing antivirus for protection iii. Forgery iv. Cyber bullying	1
3.	What is an example of e-waste? i. A ripened mango ii. Unused old shoes iii. Unused old computers iv. Empty cola cans	1

4.	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	1
5.	If column **“Fees”** contains the data set (5000,8000,7500,5000,8000), what willbe the output after the execution of the given query? **SELECT SUM (DISTINCT Fees) FROM student;** i. 20500 ii. 10000 iii. 20000 iv. 33500	1
6.	**‘O’** in FOSS stands for: i. Outsource ii. Open iii. Original iv. Outstanding	1
7.	Which SQL statement do we use to find out the total number of records presentin the table ORDERS? i. SELECT * FROM ORDERS; ii. SELECT COUNT (*) FROM ORDERS; iii. SELECT FIND (*) FROM ORDERS; iv. SELECT SUM () FROM ORDERS;	1
8.	Which one of the following is not an aggregate function? i. ROUND() ii. SUM() iii. COUNT() iv. AVG()	1
9.	Which one of the following functions is used to find the largest value from thegiven data in MySQL? i. MAX( ) ii. MAXIMUM( ) iii. BIG( ) iv. LARGE( )	1

10.	To display last five rows of a series object **‘S’**, you may write: i. S.Head() ii. S.Tail(5) iii. S.Head(5) iv. S.tail()	1
11.	Which of the following statement will import pandas library? i. Import pandas as pd ii. import Pandas as py iii. import pandas as pd iv. import panda as pd	1
12.	Which of the following can be used to specify the data while creating a DataFrame? i. Series ii. List of Dictionaries iii. Structured ndarray iv. All of these	1
13.	Which amongst the following is not an example of a browser? i. Chrome ii. Firefox iii. Avast iv. Edge	1
14.	In SQL, which function is used to display current date and time? i. Date () ii. Time () iii. Current () iv. Now ()	1
15.	Legal term to describe the rights of a creator of original creative or artistic work is: i. Copyright ii. Copyleft iii. GPL iv. FOSS	1
16.	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. i. Offline phishing ii. Offline footprint iii. Digital footprint iv. Digital phishing	1

Q17 and 18 are ASSERTION AND REASONING based questions. Mark the correct choice as

i. Both A and R are true and R is the correct explanation for A
ii. Both A and R are true and R is not the correct explanation for A
iii. A is True but R is False

	iv. A is false but R is True	
17.	**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 tostore certain information on the server's computer.	1
18.	**Assertion (A):-** DataFrame has both a row and column index. **Reasoning (R): -** A DataFrame is a two-dimensional labelled data structure likea table of MySQL.	1
	PART B	
19.	Explain the terms Web page and Home Page. OR Mention any four networking goals.	2
20.	Rashmi, a database administrator needs to display house wise total number of records of 'Red' and 'Yellow' house. She is encountering an error while executing the following query: SELECT HOUSE, COUNT (*) FROM STUDENT GROUP BY HOUSE WHERE HOUSE='RED' OR HOUSE= 'YELLOW'; Help her in identifying the reason of the error and write the correct query by suggesting the possible correction (s).	2
21.	What is the purpose of Order By clause in SQL? Explain with the help of suitable example.	2
22.	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.	2
23.	List any four benefits of e-waste management. OR Mention any four net etiquettes.	2

24. What will be the output of the following code:

2

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

25. Carefully observe the following code:

2

```
import pandas as pd Year1={'Q1':5000,'Q2':8000,'Q3':12000,'Q4': 18000}
Year2={'A' :13000,'B':14000,'C':12000}
totSales={1:Year1,2:Year2} df=pd.DataFrame(totSales) print(df)
```

Answer the following:

i. List the index of the DataFrame df

ii. List the column names of DataFrame df.

SECTION C

26. Write outputs for SQL queries (i) to (iii) which are based on the given tablePURCHASE:

3

TABLE: PURCHASE

CNO	**CNAME**	**CITY**	**QUANTITY**	**DOP**
C01	GURPREET	NEW DELHI	150	2022-06-11
C02	MALIKA	HYDERABAD	10	2022-02-19
C03	NADAR	DALHOUSIE	100	2021-12-04
C04	SAHIB	CHANDIGARH	50	2021-10-10
C05	MEHAK	CHANDIGARH	15	2021-10-20

i. **SELECT LENGTH(CNAME) FROM PURCHASE WHERE QUANTITY>100;**

ii. **SELECT CNAME FROM PURCHASE WHERE MONTH(DOP)=3;**

iii. **SELECT MOD (QUANTITY, DAY(DOP)) FROM PURCHASE WHERE CITY= ‘CHANDIGARH’;**

27. Write a Python code to create a DataFrame with appropriate column headingsfrom the list given below:

3

[[101,'Gurman',98],[102,'Rajveer',95],[103,'Samar' ,96], [104,'Yuvraj',88]]

28. Consider the given DataFrame **‘Stock’**: (3)

	Name	**Price**
0	**Nancy Drew**	**150**
1	**Hardy boys**	**180**
2	**Diary of a wimpy kid**	**225**
3	**Harry Potter**	**500**

Write suitable Python statements for the following:

1. Add a column called Special_Price with the following data:[135,150,200,440].
2. Add a new book named ‘The Secret' having price 800.
3. Remove the column Special_Price.

29. Nadar 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. (3)

She is also getting repeated mails from unknown people. Every time she goes online, she finds someone chasing her online.

1. What is this happening to Nadar?
2. What immediate action should she take to handle it?
3. Is there any law in India to handle such issues? Discuss briefly.

OR

What do you understand by plagiarism? Why is it a punishable offence? Mentionany two ways to avoid plagiarism.

30. Based on table **STUDENT** given here, write suitable SQL queries for thefollowing: (3)

Roll No	**Name**	**Class**	**Gender**	**City**	**Marks**
1	Abhishek	XI	M	Agra	430
2	Prateek	XII	M	Mumbai	440
3	Sneha	XI	F	Agra	470
4	Nancy	XII	F	Mumbai	492
5	Himnashu	XII	M	Delhi	360
6	Anchal	XI	F	Dubai	256
7	Mehar	X	F	Moscow	324
8	Nishant	X	M	Moscow	429

i. Display gender wise highest marks.
ii. Display city wise lowest marks.
iii. Display total number of male and female students.

OR

Discuss the significance of Group by clause in detail with the help of suitableexample.

SECTION D

31. Write suitable SQL query for the following: 5

i. Display 7 characters extracted from 7th left character onwards from thestring ‘INDIA SHINING’.
ii. Display the position of 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 useridof the table **‘USERS’**.

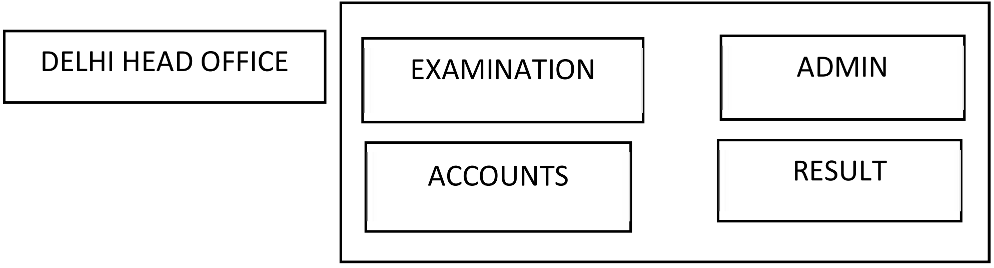
OR

Explain the following SQL functions using suitable examples.

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

32. 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. 5

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.



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 buildingswithin the MUMBAI campus for a wired connectivity.

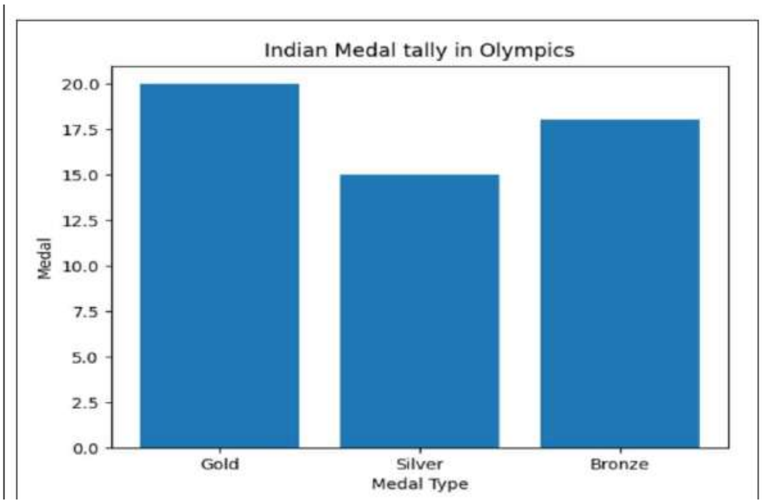
(iii) Which networking device will you suggest to be procured by the company to interconnect all the computers of various buildings of MUMBAI campus?

(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

33. Write Python code to plot a bar chart for India’s medal tally as shown below: 5



Also give suitable python statement to save this chart.

OR

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

Week=[1,2,3,4]
Avg_week_temp=[40,42,38,44]

SECTION E

34. 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** 1+1+2

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.

OR (Option for part iii only)

Write a query to count year wise total number of cloths purchased.

35. Mr. Som, a data analyst has designed the DataFrame **df** that contains data about Computer Olympiad with 'CO1', 'CO2', 'CO3', 'CO4', 'CO5' as indexes shownbelow. Answer the following questions: 1+1+2

	School	Tot_students	Topper	First_Runnerup
CO1	PPS	40	32	8
CO2	JPS	30	18	12
CO3	GPS	20	18	2
CO4	MPS	18	10	8
CO5	BPS	28	20	8

A. Predict the output of the following python statement:
  i. df.shape
  ii. df[2:4]
B. Write Python statement to display the data of Topper column of indexesCO2 to CO4.

OR (Option for part iii only)

Write Python statement to compute and display the difference of data of Tot_students column and First_Runnerup column of the above given DataFrame.

SET IV

CBSE SAMPLE QUESTION PAPER

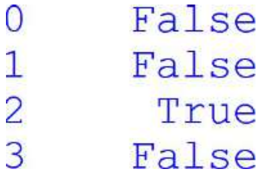
MARKING SCHEME

CLASS XII - INFORMATICS PRACTICES (065)

TIME: 3 HOURS M.M.70

1.	iii. MAN **1 mark for correct answer**	1
2.	ii. Installing antivirus for protection **1 mark for correct answer**	1
3.	iii. Unused old computers **1 mark for correct answer**	1
4.	iii. Null value **1 mark for correct answer**	1
5.	i. 20500 **1 mark for correct answer**	1
6.	ii. Open **1 mark for correct answer**	1
7.	ii. SELECT COUNT (*) FROM ORDERS; **1 mark for correct answer**	1
8.	i. ROUND( ) **1 mark for correct answer**	1
9.	i. MAX () **1 mark for correct answer**	1
10.	iv. S.tail() **1 mark for correct answer**	1
11.	iii. import pandas as pd **1 mark for correct answer**	1
12.	iv. All of these **1 mark for correct answer**	1
13.	iii. Avast **1 mark for correct answer**	1
14.	iv. Now() **1 mark for correct answer**	1
15.	i. Copyright **1 mark for correct answer**	1
16.	iii. Digital footprint **1 mark for correct answer**	1
17.	iii. A is True but R is False	1
18.	i. Both A and R are true and R is the correct explanation for A	1

19.	**Web Page:** A Web Page is a part of a website and is commonly written in HTML. It can be accessed through a web browser. **Home Page:** It is the first web page you see when you visit a website. **1 mark for correct explanation of each term** **Or** **Four networking goals are:** i. Resource sharing ii. Reliability iii. Cost effective iv. Fast data sharing **½ mark for each goal**	2
20.	The problem with the given SQL query is that WHERE clause should not be used with Group By clause. To correct the error, HAVING clause should be used instead of WHERE. Corrected Query: SELECT HOUSE, COUNT(*) FROM STUDENT GROUP BY HOUSE HAVING HOUSE= 'RED' OR HOUSE='YELLOW'; **1 Mark for error identification** **1 Mark for writing correct query**	2

21.	Order By clause: The ORDER BY command is used to sort the result set in ascending or descending order. The following SQL statement displays all the customer's names in alphabetical order: SELECT Cname FROM Customers ORDER BY Cname; **1 mark for correct purpose** **1 mark for correct example**	2
22.	St={'Beas' :18, 'Chenab' :20 , ' Ravi' :20, ' Satluj' :18}S1=pd.Series(St) **1 mark for each correct python statement**	2
23.	**The e-waste management-** **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** **½ mark for each benefit** Or **i.** No copyright violation **ii.** Share the expertise with others on the internet **iii.** Avoid cyber bullying **iv.** Respect other's privacy and diversity **½ mark for each net etiquette**	2
24.	 0 False 1 False 2 True 3 False **½ mark for each correct output**	2

25.	i. The index labels of df will include Q1,Q2,Q3,Q4,A,B,C ii. The column names of df will be: 1,2 **1 mark for each correct answer**	2
26.	i. 8 ii. No Output iii. 0 15 **1 mark for each correct output**	3

27.	import pandas as pd data=[[101,'Gurman',98],[102,'Rajveer',95],[103,'Samar' ,96],[104,'Yuvraj',88]] df=pd.DataFrame(data,columns=['Rno','Name', 'Marks']) **1 mark for each correct python statement**	3
28.	i. Stock['Special_Price']=[135,150,200,400] ii. Stock.loc['4']=['The Secret',800] iii. Stock=Stock.drop('Special_Price',axis=1) **1 mark for each correct statement**	3
29.	i. Nadar 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 cyber crime 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. **1 mark for each correct answer** OR 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 **1 mark for correct definition** **1 mark for correct justification** **½ mark each for any two ways to avoid plagiarism**	3

30.

```
i. select max(marks) from student group by gender;
ii. select min(marks) from student group by city;
iii. select gender,count(gender) from student group by gender;
```

1 mark for each correct query

OR

GROUP BY clause is used in a SELECT statement in combination with aggregate functions to group the result based on distinct values in a column.

For example:

To display total number of male and female students from the table STUDENT, we need to first group records based on the gender then we should count records with the help of count() function.

Considering the following table STUDENT:

RollNo	Name	Class	Gender	City	Marks
1	Abhishek	XI	M	Agra	430
2	Prateek	XII	M	Mumbai	440
3	Sneha	XI	F	Agra	470
4	Nancy	XII	F	Mumbai	492
5	Himnashu	XII	M	Delhi	360
6	Anchal	XI	F	Dubai	256
7	Mehar	X	F	Moscow	324
8	Nishant	X	M	Moscow	429

SQL query for the above-mentioned task is as follows:

```
select gender,count(gender) from student group by gender;
```

Output:

```
Gender      Count(Gender)
M              4
F              4
```

1 mark for correct significance2
marks for correct example

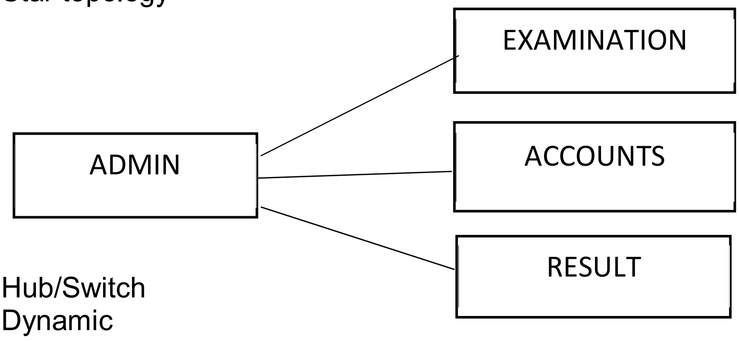
3

31.

```
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;
```

1 mark for each correct query

5

	OR **1. UCASE():** It converts the string into upper case. **Example:** SELECT UCASE(‘welcome world’); **Output:** WELCOME WORLD **2. TRIM():** It removes the leading and trailing spaces from the given string. **Example:** SELECT TRIM(‘ Welcome world ‘); **Output:** Welcome world **3. MID():** It extracts the specified number of characters from given string. **Example:** SELECT MID(‘ Welcome world,4,,4); **Output:** Come **4. DAYNAME():** It returns the weekday name for a given date **Example:** SELECT DAYNAME(‘2022-07-22’); **Output:** Friday **5. POWER():** It returns the value of a number raised to the power of another number. **Example:** SELECT POW(6,2); **Output:** 36 **½ mark for each correct explanation** **½ mark for each correct example**	
32	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 **1 Mark for each correct answer**	

33.

```
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()
```

½ mark for each correct statement
Python statement to save the chart:

```
plt.savefig("aa.jpg")
```

1 mark for the correct statement

OR

```
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()
```

1 mark for each correct statement

5

34.

```
i.  SELECT LOWER(CNAME) FROM CLOTH;
ii. SELECT MIN(PRICE) FROM CLOTH;
```

1 mark for each correct query

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

OR

```
SELECT YEAR(DOP),COUNT(*) FROM CLOTH GROUP BY
     YEAR(DOP);
```

2 marks for correct query

1+1+2

35.

A. Output:

```
  i.     (5,4)
  ii.    School     tot_students   Topper       First_Runner_up
 CO3      GPS          20           18            2
 CO4      MPS          18           10            8
```

1 mark for each correct output

B. Python statement:

```
print(df.loc['CO2': 'CO4', 'Topper'])
```

OR

```
print(df.Tot_students-df.First_Runnerup)
```

2 marks for correct Python statement

1+1+2

Index

OTHER REFERENCES

1	CBSE Question Bank :	https://cbseacademic.nic.in/web_material/QuestionBank/ClassXII/InformaticsPracticesXII.pdf
2	CBSE Sample QP 2021-22:	https://cbseacademic.nic.in/SQP_CLASSXII_2021-22.html
3	CBSE Sample QP 2020-21:	https://cbseacademic.nic.in/SQP_CLASSXII_2020-21.html
4	CBSE Curriculum Informatics Practices 2022-23 :	https://cbseacademic.nic.in/web_material/CurriculumMain23/SrSec/Informatics_Practices_SrSec_2022-23.pdf