

# KENDRIYA VIDYALAYA SANGATHAN ERNAKULAM REGION

केंद्रीय विद्यालय संगठन क्षेत्रीय कार्यालय, एर्नाकुलम



**SESSION 2023-24**  
**CLASS XII**  
**INFORMATICS PRACTICES**

**VERSION B**

**COMPREHENSIVE**  
**STUDENT SUPPORT MATERIAL**



## CHIEF PATRON



**Mr.Santhosh Kumar N**  
*Deputy Commissioner, KVS RO Ernakulam*

## PATRONS



**श्री गनेश स. ईन्द्राले ,Mrs Deepti Nair, पाटिल रमेश अभिमन्यू**  
*Assistant Commissioners, KVS RO Ernakulam*

## PRINCIPAL IN-CHARGE



**Mr Alex Jose**  
Principal I/C, K V Konni

## **MESSAGE BY THE DEPUTY COMMISSIONER**

**I am delighted to announce the release of Support Material/Study material for the students of class X and XII. In our relentless pursuit of academic excellence, we have been constantly revising and upgrading our teaching methodologies and resources. And one of the important resources is the support material which is prepared by Kendriya Vidyalayas for the students of class X and XII. This Support material is in two parts: Part A is the core concepts/topics of all subjects which aims minimum level of learning for each student and Part B is a detailed topics/lessons with practice questions which aims to foster a deeper understanding of subjects, stimulate critical thinking and helps in achieving better score in CBSE exam. Whereas Part A is planned to be printed and distributed amongst all students whereas Part B which is the larger one is planned to disseminate through electronic media/blogs.**

**I hope this support material in two parts will greatly benefit the academic journey of class X and XII not only in pursuit of good result in CBSE exams but also helpful for various entrance examinations.**

**Let's march ahead with dedicated minds and relentless endeavours for better future through better education.**

**With warm regards,**

**Shri. Santosh Kumar N  
Deputy Commissioner  
KVS Ernakulam Region**

**CONTENT AND REVIEW  
BY PGT COMPUTER SCIENCE OF ERNAKULAM REGION**

**Teacher Coordinator**

➤ **Mrs. SUJA P NAIR, PGT Comp. Sc, K V ERNAKULAM**

**Content preparation & compilation**

- MRS. SHEENA B R, K V PALLIPURAM
- MRS. HEMA R, K V ADOOR SHIFT-2
- MRS. NAJIYA P M, K V PORT TRUST
- MRS. JAS C P, K V NAD ALUVA
- MRS. LATHA RAMAKRISHNAN, K V NO.2 NAVAL BASE
- MR.SOJU S, K V INS DRONACHARYA
- MRS. RADHA MOHAN, K V PATTOM SHIFT-1
- MRS. SUNI ABRAHAM, KVRB KOTTAYAM
- MRS. BINDHIYA N, K V KELTRON NAGAR
- MRS. ASWATHY, K V THRISSUR
- MRS. BASIMA A, K V CALICUT NO.1
- MR. SREEJITH T, K V KASARGOD NO.2
- Mrs. REKHA C, K V KANNUR
- Mrs. RUBY VISWAM, K V ERNAKULAM

**Final content review**

- MRS. VRINDA S, K V PORT TRUST
- MRS. SREELEKSHMI S, K V ADOOR SHIFT-I
- MRS. SINI ALEX, K V PATTOM SHIFT-I
- MRS. HARIPRIYA, K V PANGODE



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**Informatics Practices**  
**CLASS XII**  
**Code No. 065**  
**2023-2024**

**DISTRIBUTION OF MARKS:**

<b>Unit No.</b>	<b>Unit Name</b>	<b>Marks</b>
1	Data Handling using Pandas and Data Visualization	25
2	Database Query using SQL	25
3	Introduction to Computer Networks	10
4	Societal Impacts	10
	<b>Total</b>	<b>70</b>

**Unit 1: Data Handling using Pandas -I**

Introduction to Python libraries- Pandas, Matplotlib

Data structures in Pandas - Series and Data Frames.

Series: Creation of Series from – ndarray, dictionary, scalar value; mathematical operations; Head and Tail functions; Selection, Indexing and Slicing.

Data Frames: creation - from dictionary of Series, list of dictionaries, Text/CSV files; display; iteration; Operations on rows and columns: add, select, delete, rename; Head and Tail functions; Indexing using Labels, Boolean Indexing; Importing/Exporting Data between CSV files and Data Frames.

**Data Visualization**

Purpose of plotting; drawing and saving following types of plots using Matplotlib – line plot, bar graph, histogram

Customizing plots: adding label, title, and legend in plots.

**Unit 2: Database Query using SQL**

Revision of database concepts and SQL commands covered in class XI

Math functions: POWER (), ROUND (), MOD ().

Text functions: UCASE ()/UPPER (), LCASE ()/LOWER (), MID ()/SUBSTRING ()/SUBSTR (), LENGTH (), LEFT (), RIGHT (), INSTR (), LTRIM (), RTRIM (), TRIM ().

Date Functions: NOW (), DATE (), MONTH (), MONTHNAME (), YEAR (), DAY (), DAYNAME ().

Aggregate Functions: MAX (), MIN (), AVG (), SUM (), COUNT (); using COUNT (\*).

Querying and manipulating data using Group by, Having, Order by.

Working with two tables using equi-join

**Unit 3: Introduction to Computer Networks**

Introduction to networks, Types of network: PAN, LAN, MAN, WAN.

Network Devices: modem, hub, switch, repeater, router, gateway

Network Topologies: Star, Bus, Tree, Mesh.

Introduction to Internet, URL, WWW, and its applications- Web, email, Chat, VoIP.

Website: Introduction, difference between a website and webpage, static vs dynamic web page, web server and hosting of a website.

Web Browsers: Introduction, commonly used browsers, browser settings, add-ons and plug-ins, cookies.

#### **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

#### **Practical Marks Distribution**

<b>S. No.</b>	<b>Unit Name</b>	<b>Marks</b>
1	Programs using Pandas and Matplotlib	8
2	SQL Queries	7
3	Practical file (minimum of 15 programs based on Pandas, 4 based on Matplotlib and 15 SQL queries must be included)	5
4	Project Work (using concepts learned in class XI and XII)	5
5	Viva-Voce	5
	TOTAL	30

# 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 ndarray and its fast and efficient 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

Diagram illustrating a Series structure. The top row shows indices (0, 1, 2, 3, 4) labeled as "Index/Label". The bottom row shows corresponding data values (abc, def, ghi, Jkl, mno) labeled as "1D Data values".

## 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 data value. 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 can be 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 as shown 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 is assigned to that particular index.
  - The order in which the index arguments are specified determines the order of the

elements in 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 scalar value 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 be created 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= 0 1.0
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
```

## 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 be 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: int64 y=  
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

```
import 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  
y=  
9 191  
10 201  
11 211  
dtype: int64
```

```
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 brackets will 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 by Python.

```
# 17 indexing a Series object multiple
labels import pandas as pd

d={'a':101, 'b':102, 'c':103, 'd':104, 'e':105, 'f':106}
s=pd.Series(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 endlable values including the endlable 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	<p>What will be the output of following code-</p> <pre>import pandas as pd s1=pd.Series([1,2,2,7,'Sachin',77.5]) print(s1.head()) print(s1.head(3))</pre> <p>Ans:</p> <pre>0      1 1      2 2      2 3      7 4  Sachin dtype: object</pre> <pre>0      1 1      2 2      2 dtype: object</pre>
2	<p>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.</p> <p>Ans:</p> <pre>S=pd.Series([5,10,15,20,25],index=['a','b','c','d','e'])</pre>
3	<p>Name any two attributes of Series in Python</p> <p>Ans. Two attributes of Series in Python are :</p> <ol style="list-style-type: none"><li>1. index</li><li>2. values</li></ol>
4	<p>Write the output of the following :</p> <pre>import numpy as num import pandas as pd arr=num.array([1,7,21]) S1 = pd.Series(arr) print(S1)</pre> <p>Ans.</p> <pre>0      1 1      7 2     21 dtype: int32</pre>



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	<p>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.</p> <ol style="list-style-type: none"> <li>1. Series</li> <li>2. DataFrame</li> <li>3. Panel</li> </ol>												
8	<p>Name three data structures available in Pandas.  <b>Ans. Three data structures available in Pandas are :</b></p> <ol style="list-style-type: none"> <li>1. Series</li> <li>2. DataFrame</li> <li>3. Panel</li> </ol>												
9	<p>Write the code in python to create an empty Series.          Ans.</p> <pre>import pandas as pd S1 = pd.Series( ) print(S1)</pre> <p>OR</p> <pre>import pandas as pd S1 = pd.Series( None) print(S1)</pre> <p>OUTPUT : Series([ ], dtype: float64)</p>												
10	<p>Define data structure in Python.          Ans. A data structure is a collection of data values and operations that can be applied to that data.</p>												
11	<p>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:</p> <table border="0"> <thead> <tr> <th>Index</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Arnab</td> </tr> <tr> <td>1</td> <td>Samridhi</td> </tr> <tr> <td>2</td> <td>Ramit</td> </tr> <tr> <td>3</td> <td>Divyam</td> </tr> <tr> <td>4</td> <td>Kritika</td> </tr> </tbody> </table>	Index	Value	0	Arnab	1	Samridhi	2	Ramit	3	Divyam	4	Kritika
Index	Value												
0	Arnab												
1	Samridhi												
2	Ramit												
3	Divyam												
4	Kritika												
12	<p>Write command to install pandas in python.          Ans. pip install pandas</p>												

13	<p>Write the output of the following :</p> <pre>import pandas as pd S1 = pd.Series(range(100, 150, 10), index=[x for x in "My name is Amit Gandhi".split()]) print(S1)</pre> <p>Ans.</p> <pre>My      100 name    110 is      120 Amit    130 Gandhi  140 dtype: int64</pre>
14	<p>Write the output of the following :</p> <pre>import pandas as pd L1=[1,"A",21] S1 = pd.Series(data=2*L1) print(S1)</pre> <p>Ans.</p> <pre>0    1 1    A 2   21 3    1 4    A 5   21 dtype: object</pre>
15	<p>Which property of series return all the index value?</p> <p>Ans. index property return all the index value</p>
16	<p>Write the output of the following :</p> <pre>import pandas as pd S1 = pd.Series(range(1,15,3), index=[x for x in "super"]) print(S1)</pre> <p>Ans.</p> <pre>s    1 u    4 p    7 e   10 r   13 dtype: int64</pre>

17	<p>Complete the code to get the required output :</p> <pre>import _____ as pd _____ = pd.Series([31, 28, 31], index = ["Jan", "Feb", "Mar"] ) print(S1["_____"])</pre> <p>OUTPUT :</p> <p>28</p> <p>Ans.</p> <pre>import pandas as pd S1 = pd.Series([31,28,31], index = ["Jan","Feb","Mar"]) print(S1["Feb"])</pre>
18	<p>Fill in the blank of given code, if the output is 71.</p> <pre>import pandas as pd S1 = pd.Series([10, 20, 30, 40, 71,50]) print(S1[ _____ ])</pre> <p>Ans.</p> <pre>import pandas as pd S1 = pd.Series([10, 20, 30, 40, 71,50]) print(S1[ 4 ])</pre>
19	<p>Write a program to modify the value 5000 to 7000 in the following Series “S1”</p> <p>A 25000 B 12000 C 8000 D 5000</p> <p>Ans.</p> <pre>import pandas as pd S1[3]=7000 print(S1)</pre>
20	<p>Write a program to display only those values greater than 200 in the given Series “S1”</p> <p>0 300 1 100 2 1200 3 1700</p> <p>Ans.</p> <pre>import pandas as pd S1 = pd.Series([300, 100, 1200, 1700]) print(S1[S1&gt;200])</pre>

## 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)
```

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

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

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

```
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)
```

- 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.

	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

### ➤ 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():
```

```
    print("Row index:",row)
```

```
    print("containing")
```

```
    i=0
```

```
    for val in rowseries:
```

```
        print("At position ",i,":",val)
```

```
        i=i+1
```

```
    print()
```

	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
```

- 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():
```

	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
```

```

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

```

## ❖ 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.**

	p_id	p_name
0	101	Hard disk
1	102	Pen Drive

	Product_ID	product_name
0	101	Hard disk
1	102	Pen Drive

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)
```

- 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)
```

	Product_ID	product_name
0	101	Hard disk
1	102	Pen Drive

```
df.columns=['Product_ID','product_name']
print(df,"\n")
```

### ❖ Reindexing

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

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

Syntax:

<DF>.reindex(index=None, columns=None, fill\_value=NaN)

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

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

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

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

- 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.) .

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

- This helps in displaying the rows of Data Frame, according to True or False as specified in the command.

```
True 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.

<DataFrame 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
  - b) `print(df.A['DEPT'])`
  - c) `print(df['A','DEPT'])`
  - d) `print(df.iloc[1:2,1:2])`
  - e) `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

ii.

- 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  $\geq 20$  range of 12 to 20
- ii. Write command to set all values 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 output 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

**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	<p>To display the 3rd, 4th and 5th columns from the 6th to 9th rows of a dataframe you can write</p> <p>(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]</p> <p><b>ANS: c) DF.iloc[6:10, 3:6]</b></p>
2	<p>We can add a new row to a DataFrame using the _____ method</p> <p>(i) rloc[ ]            (ii) loc[ ]            (iii)iloc[ ]</p>

	(iv)None of the above <b>ANS: (ii) loc[ ]</b>
3	The head() function of dataframe will display how many rows from top if no parameter is passed. (i) 1 (ii) 3 (iii) 5 (iv) None of these  <b>ANS : (iii) 5</b>
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  <b>ANS:- d) DF.iat[3, 5] = 35</b>
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  <b>ANS: b) D.iloc</b>
6	In a DataFrame, Axis= 0 represents the _____ elements  a.rows b.columns c.both d.None of these.  <b>ANS: a.rows</b>
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  <b>ANS: (iii)Last (Right Side)</b>
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  <b>ANS: d. All of the above</b>
9	Write the code to append df2 with df1

	<p>a. Df2=Df2.append(Df1)  b. Df2=Df2+Df1  c. Df2=Df2.appendwith.Df1  d. Df2=Df1.append(Df1)</p> <p><b>ANS: a.Df2=Df2.append(Df1)</b></p>
10	<p>When we create DataFrame from List of Dictionaries, then number of columns in DataFrame is equal to the _____</p> <p>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</p> <p><b>ANS: b. maximum number of different keys in all dictionaries of the list</b></p>
11	<p>When we create DataFrame from List of Dictionaries, then dictionary keys will become _____</p> <p>(i) Column labels  (ii) Row labels  (iii) Both of the above  (iv) None of the above</p> <p><b>ANS: (i) Column labels</b></p>
12	<p>Which method is used to access vertical subset of a dataframe?</p> <p>(i) iterrows()  (ii) iteritems()  (iii) itercolumns()  (iv) itercols()</p> <p><b>ANS: (ii) iteritems()</b></p>
13	<p>Write statement to transpose dataframe DF.</p> <p>(i) DF.t  (ii) DF.transpose  (iii) DF.T  (iv) DF.T()</p> <p><b>ANS: (iii) DF.T</b></p>
14	<p>In DataFrame, by default new column added as the _____ column</p> <p>a. First (Left Side)  b. Second  c. Last (Right Side)  d. Any where in dataframe</p> <p><b>ANS: Last (Right Side)</b></p>
15	<p>We can add a new row to a DataFrame using the _____ method</p> <p>(i) rloc[ ]  (ii) loc[ ]  (iii) iloc[ ]  (iv) None of the above</p>

	<b>ANS: (ii) loc[ ]</b>
16	<p>Which of the following function is used to load the data from the CSV file to DataFrame?</p> <p>(i) read.csv()  (ii) readcsv()  (iii) read_csv()  (iv) Read_csv()</p> <p><b>ANS: (iii) read_csv()</b></p>
17	<p><i>Which of the following function is not a Boolean reduction function</i></p> <p>(i) Empty  (ii) Any()  (iii) All()  (iv) Fillna()</p> <p><b>ANS: (iv) Fillna()</b></p>
18	<p>Which among the following options can be used to create a DataFrame in Pandas ?</p> <p>(a) A scalar value  (b) An ndarray  (c) A python dict  (d) All of these</p> <p><b>ANS:- (d) All of these</b></p>
19	<p>Which attribute of a dataframe is used to convert row into columns and columns into rows in a dataframe?</p> <p>a) T  b) ndim  c) empty  d) shape</p> <p><b>ANS: a) T</b></p>
20	<p>When we create DataFrame from List of Dictionaries, then number of columns in DataFrame is equal to the _____</p> <p>(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</p> <p><b>ANS: (ii) maximum number of different keys in all dictionaries of the list</b></p>
21	<p>Which of the following is/are characteristics of DataFrame?</p> <p>a) Columns are of different types  b) Can Perform Arithmetic operations  c) Axes are labeled (rows and columns)  d) All of the above</p> <p><b>ANS: d) All of the above</b></p>
22	<p>Write short code to show the information having city="Delhi" from dataframe SHOP.</p>

	<p>(a) print(SHOP[City=='Delhi'])  (b) print(SHOP[SHOP.City=='Delhi'])  (c) print(SHOP[SHOP.'City']=='Delhi')  (d) print(SHOP[SHOP[City]=='Delhi'])</p> <p><b>ANS: (b) print(SHOP[SHOP.City=='Delhi'])</b></p>
23	<p>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</p> <p><b>ANS: (ii) pip install pandas</b></p>
24	<p>Which attribute of a dataframe is used to get number of axis?  a.T  b.Ndim  c.Empty  d.Shape</p> <p><b>ANS: b.Ndim</b></p>
25	<p>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</p> <p><b>ANS: (iv) All of the above</b></p>
26	<p>To delete a column from a DataFrame, you may use statement.  (a) remove  (b) del  (c) drop  (d) cancel statement.</p> <p><b>ANS:- (b) del</b></p>
27	<p>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)</p> <p>(i) 3, 3  (ii) 3, 4  (iii) 3, 5  (iv) None of the above</p> <p><b>ANS: (iii) 3, 5</b></p>
28	<p>To delete a row from a DataFrame, you may use  (a) remove  (b) del</p>

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

	(iv)Read_csv() <b>ANS: (iii)read_csv()</b>
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] <b>ANS: (b) df=df[df.salary!=5000]</b>
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 <b>ANS: (iii)Both of the above</b>
37	To iterate over horizontal subsets of dataframe, (a) iterate( ) (b) iterrows( ) function may be used. (c) intercols( ) (d) iteritems( ) <b>ANS:- (b) iterrows( ) function may be used.</b>
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') <b>ANS: (a) df=df.drop('A1')</b>
39	A two-dimension labeled array that is an ordered collection of columns to store heterogeneous data type is i. Series ii. Numpy array iii. Dataframe iv. Panel <b>ANS:- iii. Dataframe</b>
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 <b>ANS:- (b) skiprows - (1, 3, 5]</b>
41	In Pandas _____ is used to store data in multiple columns.



	<p>(i) Series  (ii) DataFrame  (iii) Both of the above  (iv) None of the above</p> <p><b>ANS: (ii) DataFrame</b></p>
42	<p>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</p> <p><b>ANS: a. 2 D array with heterogeneous data</b></p>
43	<p>In a DataFrame, Axis= 1 represents the _____ elements  (a) Row  (b) Column  (c) True  (d) False</p> <p><b>ANS: (b) Column</b></p>
44	<p>Which of the following is not an attribute of a DataFrame Object ?  a. index  b. Index  c. size  d. value</p> <p><b>ANS: b. Index</b></p>
45	<p>To get top 5 rows of a dataframe, you may use  (a) head( )  (b) head(5)  (c) top( )  (d) top(5)</p> <p><b>ANS:- (a) head( ) , b) head(5)</b></p>
46	<p>27. To iterate over horizontal subsets of dataframe,  (a) iterate( )  (b) iterrows( ) function may be used.  (c) itercols( )  (d) iteritems( )</p> <p><b>ANS:- (b) iterrows( ) function may be used.</b></p>
47	<p>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')</p>

	<b>ANS: (a) df=df.drop('A1')</b>
48	<p>A two-dimension labelled array that is an ordered collection of columns to store heterogeneous datatype is</p> <ul style="list-style-type: none"> <li>v. Series</li> <li>vi. ii. Numpy array</li> <li>vii. iii. Dataframe</li> <li>viii. iv. Panel</li> </ul> <p><b>ANS:- iii. Dataframe</b></p>
49	<p>To skip 1st, 3rd and 5th rows of CSV file, which argument will you give in read_csv() ?</p> <ul style="list-style-type: none"> <li>(a) skiprows = 11315</li> <li>(b) skiprows - (1, 3, 5]</li> <li>(c) skiprows = [1, 5, 1]</li> <li>(d) Any of these</li> </ul> <p><b>ANS:- (b) skiprows - (1, 3, 5]</b></p>
50	<p>In a DataFrame, Axis= 1 represents the _____ elements</p> <ul style="list-style-type: none"> <li>(a) Row</li> <li>(b) Column</li> <li>(c) True</li> <li>(d) False</li> </ul> <p><b>ANS: (b) Column</b></p>
51	<p>NaN stands for:</p> <ul style="list-style-type: none"> <li>a. Not a Number</li> <li>b. None and None</li> <li>c. Null and Null</li> <li>d. None a Number</li> </ul> <p><b>ANS: a. Not a Number</b></p>
52	<p>To get top 5 rows of a dataframe, you may use</p> <ul style="list-style-type: none"> <li>(a) head( )</li> <li>(b) head(5)</li> <li>(c) top( )</li> <li>(d) top(5)</li> </ul> <p><b>ANS:- (a) head( ) , b) head(5)</b></p>
53	<p>The correct statement to read from a CSV file in a dataframe is :</p> <ul style="list-style-type: none"> <li>(a) .read_csv()</li> <li>(b) . read_csv( )()</li> <li>(c) = pandas.read()</li> <li>(d) = pandas.read_csv()</li> </ul> <p><b>ANS:- (d) = pandas.read_csv()</b></p>
54	<p>To delete a column from a dataframe, you may use _____ statement.</p> <ul style="list-style-type: none"> <li>i. remove()</li> <li>ii. ii. del()</li> <li>iii. iii. drop()</li> <li>iv. iv. cancel()</li> </ul>

	<b>ANS:- iii. drop()</b>
55	<p>The following code create a dataframe named 'Df1' with _____ columns.</p> <pre>import pandas as pd Df1 = pd.DataFrame([10,20,30] )</pre> <p>(i) 1 (ii) 2 (iii) 3 (iv) 4</p> <p><b>ANS: (i) 1</b></p>
56	<p>To delete a row from dataframe, you may use _____ statement.</p> <p>i. remove() ii. del() iii. drop() iv. cancel()</p> <p><b>ANS:- ii. del()</b></p>
57	<p>In a Data-Frame, Axis= 0 represents the elements along the _____</p> <p>a. Row b. Column c. Row and Column Both d. None of the above</p> <p><b>ANS: a. Row</b></p>
58	<p>_____ method in Pandas can be used to change the index of rows and columns of a Series or Dataframe</p> <p>(a) rename() (b) reindex() (c) reframe() (d) none of these</p> <p><b>ANS: (b) reindex()</b></p>
59	<p>Write the single line command to delete the column "marks" from dataframe df using drop function.</p> <p>(a) df=df.drop(col='marks') (b) df=df.drop('marks',axis=col) (c) df=df.drop('marks',axis=0) (d) df=df.drop('marks',axis=1)</p> <p><b>ANS: (d) df=df.drop('marks',axis=1)</b></p>
60	<p>Which of the following is used to give user defined column index in DataFrame?</p> <p>(i) index (ii) column (iii) columns (iv) colindex</p> <p><b>ANS: (iii) columns</b></p>
61	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'**

62

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.**

63

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)**

64

Assuming the given structure, which command will give us the given output:

**Output Required: (3,4)**

	EmpCode	Name	Desig
0	1405	VINAY	Clerk
1	1985	MANISH	Works Manager
2	1636	SMINA	Sales Manager
3	1689	RINU	Cleark

- a. print(df.shape())
- b. print(df.shape)
- c. print(df.size)
- d. print(df.size()).

**ANS: b. print(df.shape)**

65

Write the output of the given command: *df1.loc[:0,'Name']* Consider the given dataframe.

	<i>EmpCode</i>	<i>Name</i>	<i>Desig</i>
0	1405	VINAY	Clerk
1	1985	MANISH	Works Manager
2	1636	SMINA	Sales Manager
3	1689	RINU	Clerk

- a. 0 1405 VINAY Clerk
- b. VINAY
- c. Works Manager

*d. Clerk*  
***ANS : VINAY***

# 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.				When opened with text editor like Notepad.
medaltally.csv				medaltally.csv
Sport	Gold medal	Silver medal	Bronze medal	<i>Sport,Gold medal,Silver medal,Bronze medal</i>
Weightlifting	3	3	4	<i>Weightlifting,3,3,4</i>
Judo	0	2	1	<i>Judo,0,2,1</i>
Lawn bowls	1	1	0	<i>Lawn bowls,1,1,0</i>
Table Tennis	3	1	1	<i>Table Tennis,3,1,1</i>
Badminton	3	1	2	<i>Badminton,3,1,2</i>
Squash	0	0	2	<i>Squash,0,0,2</i>
Para Powerlifting	1	0	0	<i>Para Powerlifting,1,0,0</i>
Athletics	1	4	3	<i>Athletics,1,4,3</i>
Wrestling	6	1	5	<i>Wrestling,6,1,5</i>
Boxing	3	1	3	<i>Boxing,3,1,3</i>
Para Table Tennis	1	0	1	<i>Para Table Tennis,1,0,1</i>
Hockey	0	1	1	<i>Hockey,0,1,1</i>
Cricket	0	1	0	<i>Cricket,0,1,0</i>

## 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=None, 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)
```

Sport	Gold medal	Silver medal	Bronze medal
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)
```

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

**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)
```

Sport	Gold medal	Silver medal	Bronze medal
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			
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)
```

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

### 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 column labels are not present in file processed2\_medaltally.csv.

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

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

### 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)
```

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

### 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)
```

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

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='#')
```

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

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
<b>Household</b>	10	12	12	23
<b>Agriculture</b>	1	3	8	18
<b>Industries</b>	40	50	45	44
<b>Transport</b>	44	28	22	2
<b>Service</b>	5	7	13	13

- pandas.read\_csv('sectors\_economy.csv', header = 0, index\_col = 0 )
- pandas.read\_csv('sectors\_economy.csv', header = 0, index\_col = 1 )
- pandas.read\_csv('sectors\_economy.csv', header = 1, index\_col = 0 )
- 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

- Which of the commands will correctly write literacy to literacy.csv with index and column labels.
  - literacy.to\_csv("literacy.csv", index = False, header = False )
  - literacy.to\_csv("literacy.csv", index = True, header = False)
  - literacy.to\_csv("literacy.csv", index = False, header = True)
  - literacy.to\_csv("literacy.csv", index = True, header = True)
- Which of the commands will correctly write literacy to literacy.csv without index and column labels i.e the data alone.
  - literacy.to\_csv("literacy.csv", index = False, header = False )
  - literacy.to\_csv("literacy.csv", index = True, header = False)
  - literacy.to\_csv("literacy.csv", index = False, header = True)
  - literacy.to\_csv("literacy.csv", index = True, header = True)
- Which of the arguments needs to be set so that the index labels will be written into literacy.csv.
  - index
  - header
  - index\_col
  - header\_row
- The argument to be set in read\_csv for reading user specified number of rows from a csv file is:
  - rows
  - row
  - nrows
  - nrow

### Answers

- a
- d
- a
- a
- 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 matplotlib 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]
```

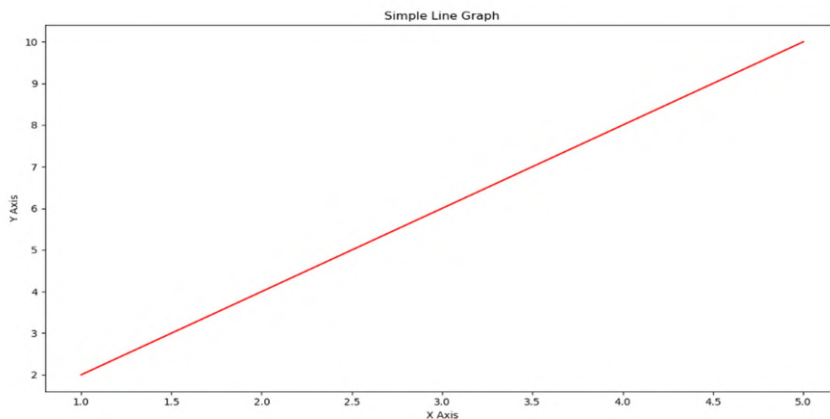
```
plt.title('Simple Line Graph')
```

```
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 set 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

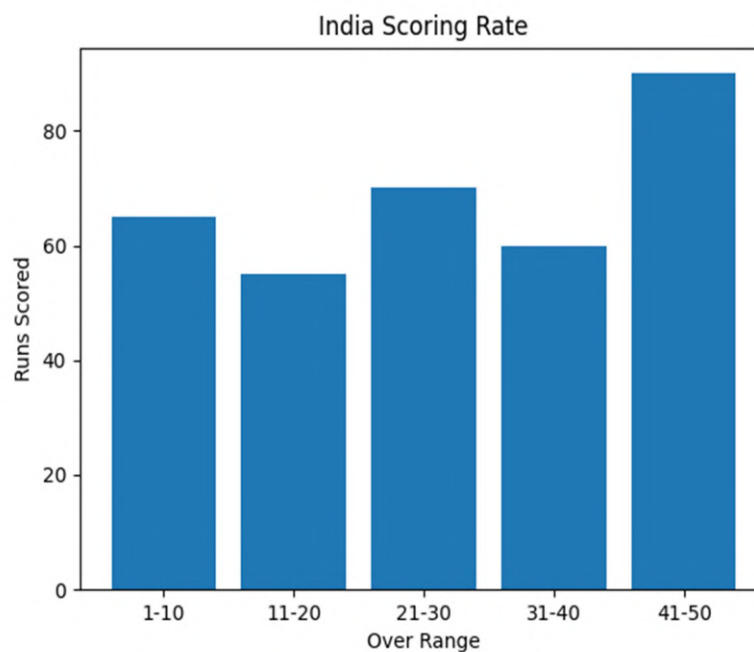
- **Label-**

`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()
```





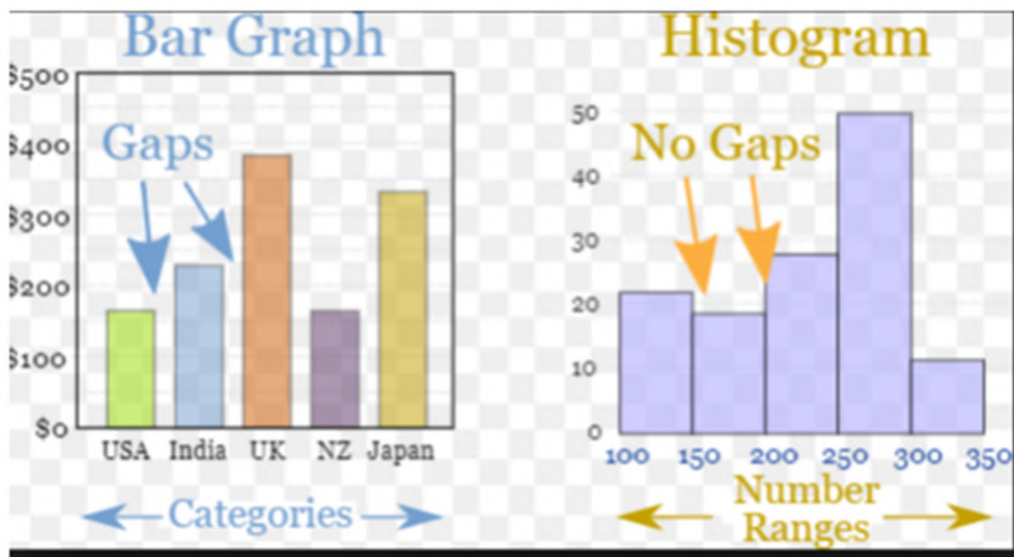
## HISTOGRAM

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:**

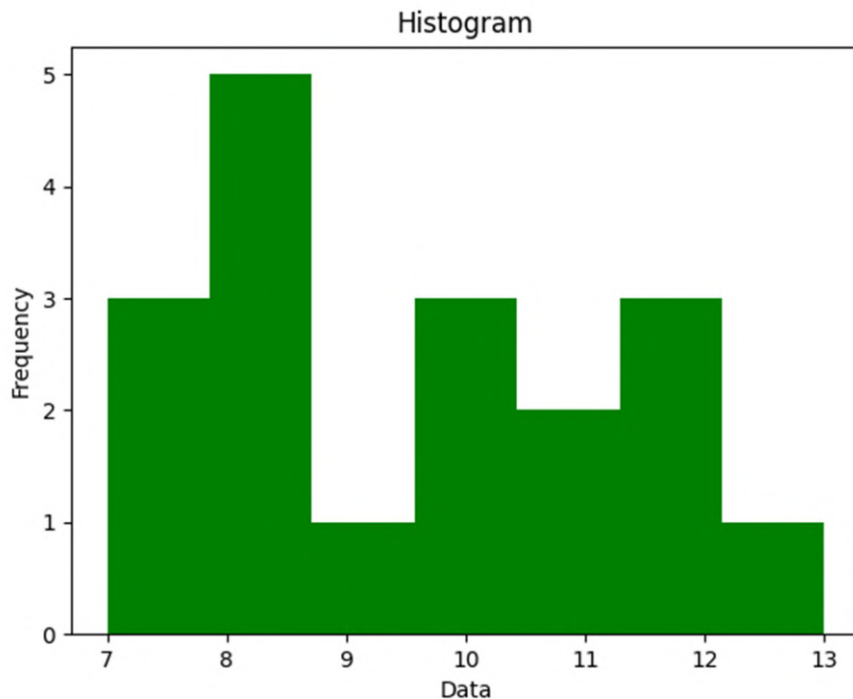
**plt.hist(x,other parameters)**

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 syntax 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

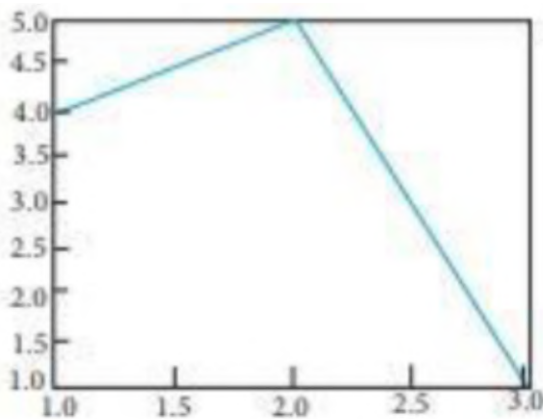
```
import matplotlib.pyplot as plt
marks=[30,10,55,70,50,25,75,49,28,81]
plt.____(marks, bins='auto', color='green')
plt.show()
```

- (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.

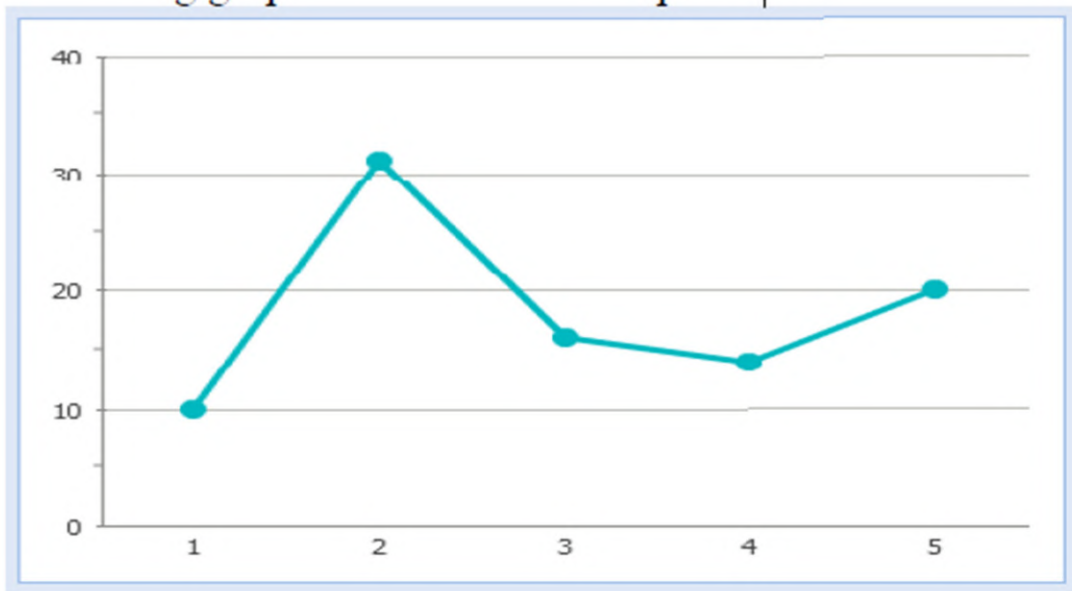
Hint 2: The line in this type of chart is often drawn chronologically.

- 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

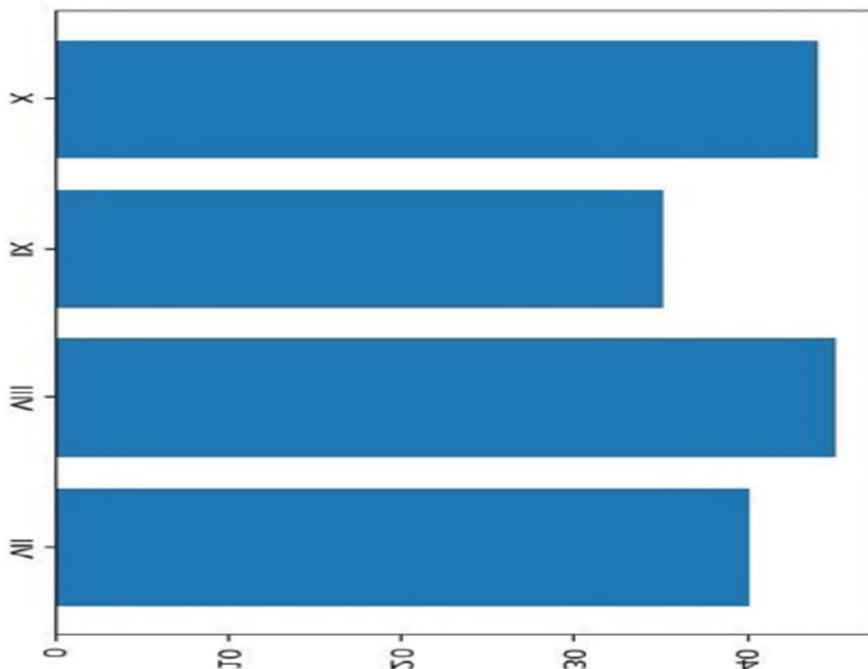
8.Which function is used to show legend ?

- 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

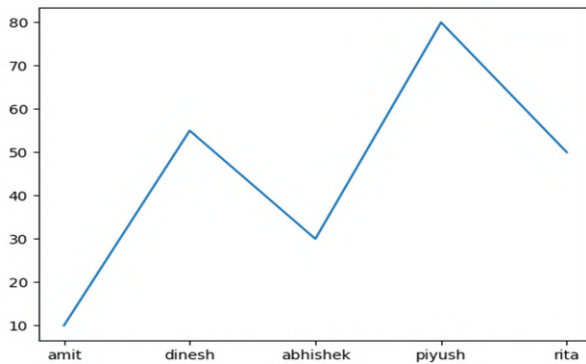
1. To specify the style of line as dashed, which argument of plot() needs to be set ?

- 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) **hsth()**
- 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.

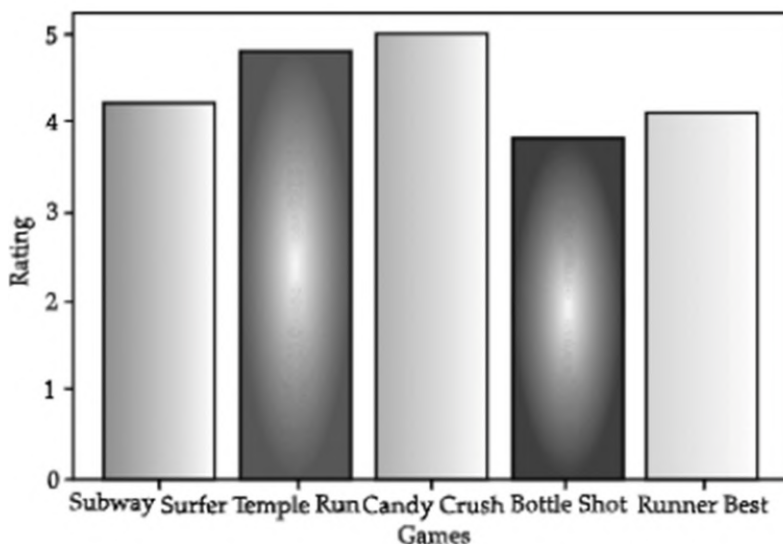
- a) Statement A is correct
- b) Statement B is correct
- c) Statement A is correct, but Statement B is incorrect
- d) Statement A is incorrect, but Statement B is correct

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.pyplot 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 histogram

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

### ANSWERS

1. d) linestyle
2. c) hist()
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()
```

# UNIT 2

## DBMS-DATABASE MANAGEMENT SYSTEM

### DBMS:

A database management system (DBMS) is a collection of interrelated data and a set of programs to access those data. The collection of data, usually referred to as the database, contains information relevant to an enterprise.

### The DBMS provides a way to

store and retrieve database information that is both convenient and efficient.

Keeping organizational information in a file- processing system has a number of major disadvantages like:

- a) Data redundancy and inconsistency
- b) Difficulty in accessing data
- c) Data isolation
- d) Integrity problems
- e) Atomicity problems
- f) Concurrent access anomalies
- g) Security problems

These difficulties among others prompted the development of database systems.

- Database systems are designed to manage large bodies of information.
- Management of data involves both defining structures for storage of information and providing mechanisms for the manipulation of information.
- The database system also must ensure the safety of the information stored, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results.
- DBMS lets users to create a database, store, manage, update/modify and retrieve data from that database by users or application programs.

Some examples of open source and commercial DBMS include MySQL, Oracle, PostgreSQL, SQL Server, Microsoft Access, MongoDB.

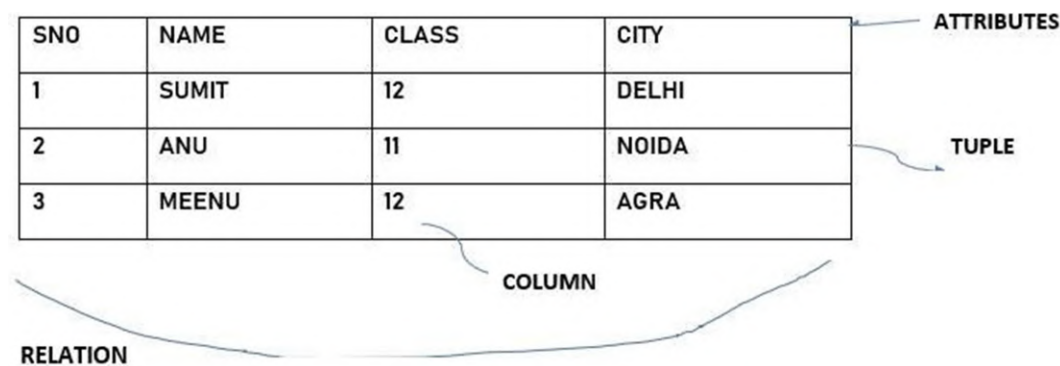
Database systems are widely used. Some representative applications are :

- a) Banking
- b) Airlines
- c) Universities
- d) Telecommunications
- e) Sales
- f) Finance, etc.

**Relational model:**

- The relational model uses a collection of tables to represent both data and the relationships among those data.
- Each table has multiple columns, and each column has a unique name. The relational model is an example of a record – based model.
- Record- based models are so named because the database is structured in fixed- format records of several types. Each table contains records of particular type. Each record type defines a fixed number of fields/attributes.
- The columns of the table correspond to the attributes of the record type.
- A row in a table represents a relationship among a set of values.
- The relational data model is the most widely used data model.

Other types of data models include object-oriented data model, entity-relationship data model, document model and hierarchical data model.



- **Relation:** A Relation is logically related data organized in the form of tables.
- **Attribute/ Field:** Column of a table is called Attribute or Field.
- **Tuple/ Entity/ Record:** Rows of a table is called Tuple or Record.
- **Domain:** It is collection of values from which the value is derived for a column.
- **Degree -** Number of columns (attributes) in a table.
- **Cardinality -** Number of rows (Records) in a table.

**Primary Key** – A primary is a column or set of columns in a table that uniquely identifies tuples (rows) in that table.

**Candidate Key** –It is an attribute or a set of attributes or keys participating for PrimaryKey, to uniquely identify each record in that table.

**Alternate Key** – Out of all candidate keys, only one gets selected as primary key, remaining keys are known as alternate or secondary keys.

**Foreign Key** – Foreign keys are the columns of a table that points to the primary key of another table.



### STRUCTURED QUERY LANGUAGE(SQL)

Structured Query Language: introduction, Data Definition Language and Data Manipulation Language, data type (char(n), varchar(n), int, float, date), constraints (not null, unique, primary key), create database, use database, show databases, drop database, show tables, create table, describe table.

#### What is SQL?

SQL(Structured Query Language) is a language that is used to manage data that is held in a relational database management system. It uses tables to manipulate and retrieve information from databases for analysis.

By using SQL commands, one can search for any data in the database and perform other functions like creating tables, adding records, modifying data, removing rows, dropping tables etc.

#### What Can SQL do?

SQL can execute queries against a database

SQL can retrieve data from a database

SQL can insert records in a database

SQL can update records in a database

SQL can delete records from a database

SQL can create new databases  
SQL can create new tables in a database  
SQL can create stored procedures in a database  
SQL can create views in a database  
SQL can set permissions on tables, procedures, and views

### **ADVANTAGES OF SQL**

There are the following advantages of SQL:

- *High speed*

Using the SQL queries, the user can quickly and efficiently retrieve a large amount of records from a database.

- *No coding needed*

In the standard SQL, it is very easy to manage the database system. It doesn't require a substantial amount of code to manage the database system.

- *Well defined standards*

Long established are used by the SQL databases that are being used by ISO and ANSI.

- *Portability*

SQL can be used in laptop, PCs, server and even some mobile phones.

- *Interactive language*

SQL is a domain language used to communicate with the database. It is also used to receive answers to complex questions in seconds.

- *Multiple data view*

Using the SQL language, the users can make different views of the database structure

### **SQL Commands**

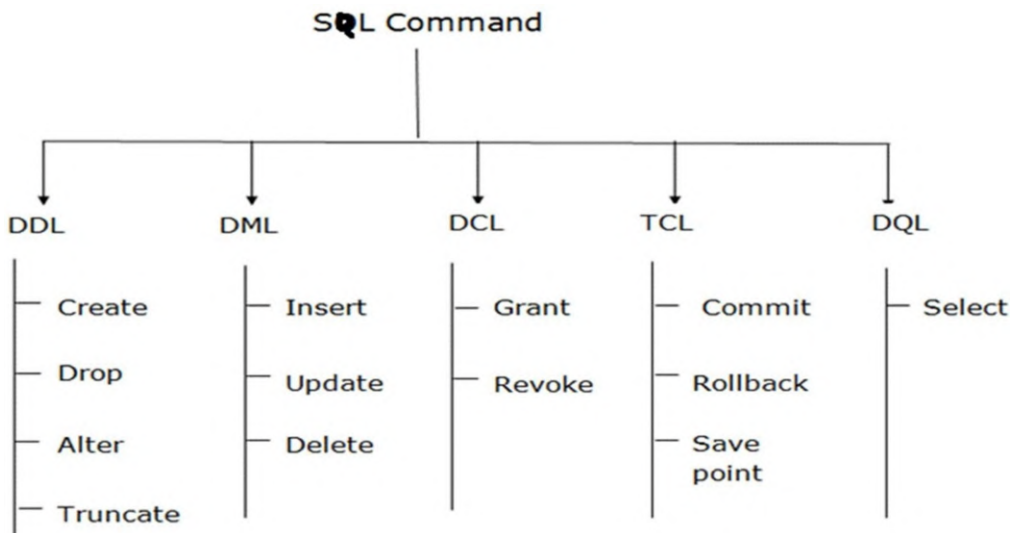
SQL commands are instructions. It is used to communicate with the database. It is also used to perform specific tasks, functions, and queries of data.

SQL can perform various tasks like create a table, add data to tables, drop the table, modify the table, set permission for users.

### **Types of SQL Commands**

There are five types of SQL commands: DDL, DML, DCL, TCL, and DQL.





A set of SQL commands used to create, modify, and delete database structures but not data.

List of DDL commands:

**CREATE**: This command is used to create the database or its objects (like table, index, function, views, store procedure, and triggers).

**DROP**: This command is used to delete objects from the database.

**ALTER**: This is used to alter the structure of the database.

**TRUNCATE**: This is used to remove all records from a table, including all spaces allocated for the records are removed.

**COMMENT**: This is used to add comments to the data dictionary.

**RENAME**: This is used to rename an object existing in the database.

DML (Data Manipulation Language):

The SQL commands that deals with the manipulation of data present in the database belong to DML or Data Manipulation Language and this includes most of the SQL statements. It is the component of the SQL statement that controls access to data and to the database. Basically, DCL statements are grouped with DML statements.

List of DML commands:

INSERT : It is used to insert data into a table.

UPDATE: It is used to update existing data within a table.

DELETE : It is used to delete records from a database table.

Difference between DDL and DML:

### List of DDL commands:

**CREATE**: This command is used to create the database or its objects (like table, index, function, views, store procedure, and triggers).

**DROP**: This command is used to delete objects from the database.

**ALTER**: This is used to alter the structure of the database.

**TRUNCATE**: This is used to remove all records from a table, including all spaces allocated for the records are removed.

**COMMENT**: This is used to add comments to the data dictionary.

**RENAME**: This is used to rename an object existing in the database.

### **Difference between DDL and DML:**

<b>DDL</b>	<b>DML</b>
<ul style="list-style-type: none"><li>• It stands for Data Definition Language.</li><li>• It is used to create database schema and can be used to define some constraints as well.</li><li>• It basically defines the column (Attributes) of the table.</li></ul>	<ul style="list-style-type: none"><li>• It stands for Data Manipulation Language.</li><li>• It is used to add, retrieve or update the data.</li><li>• It add or update the row of the table. These rows are called as tuple.</li></ul>

### **DATATYPES**

#### ➤ **Text Data types**

Char(size) – fixed length of size bytes

Varchar(size)-variable length of size bytes

#### ➤ **Number Data types**

Integer(size)or Int- It represents a number without decimal point

Float(Size)-It represents a floating point number

Real-Same as float but no size argument is used

#### ➤ **Date data type**

Date , Time

## CONSTRAINT

A Constraint is a condition or check applicable on a field or set of fields.

### Types of Constraints:

- **Unique Constraint** :-This ensures that no rows have the same value in the specified column(s)

### Syntax:

**Create table EMP (ecode integer unique, ename char(20),gender char(1),gradechar(2));**

Unique constraint applied on ecode of EMP table ensures that no rows have the same ecode value

- **Primary key Constraint**:- This declares a column as the primary **key** of the table This is similar to **unique** constraint except that one column (or one group of columns) can be applied in this constraint .

The primary key cannot allow NULL values but Unique key allows NULL values.

The following SQL creates a PRIMARY KEY on the "ID" column when the "Persons" table is created:

```
CREATE TABLE Persons ( ID int NOT NULL, LastName varchar(255) NOT NULL,FirstName varchar(255),Age int,PRIMARY KEY (ID));
```

- **Not null**:-This constraint ensures column should not be NULL

### Syntax:

**Create table EMP(ecode integer Not null unique, ename char(20),sex char(1),gradechar(2));**

## DATABASE COMMANDS IN MYSQL

### ➤ CREATE DATABASE

CREATE DATABASE is the SQL command used for creating a database in MySQL.

Imagine you need to create a database with name "movies".

You can create a database in MySQL by executing following SQL command

**Syntax:** mysql>CREATE DATABASE movies;

### ➤ SHOW DATABASES

You can see list of existing databases by running following SQL command.

**Syntax:** mysql>SHOW DATABASES;

➤ **USE**

You can use SQL command **USE** to select a particular database.

**Syntax:** mysql>USE database\_name;

➤ **DROP DATABASE**

The DROP DATABASE statement is used to drop an existing SQL database.

**Syntax :**mysql>DROP DATABASE database\_name;

**CREATE TABLE**

The CREATE TABLE statement is used to create a new table in a database.

**Syntax:** CREATE TABLE *table\_name* (*column1 datatype*,  
*column2datatype*,..... *column3 datatype*, );

**Example:** The following example creates a table called "Persons" that contains five columns:

PersonID, LastName, FirstName, Address, and City:

```
CREATE TABLE Persons (  
    PersonID int, LastName varchar(255), FirstName varchar(255), Address varchar(255), City  
    varchar(255) );
```

➤ **SHOW TABLES;**

We can get the number of table information of a database using the following statement:

```
mysql> SHOW TABLES;
```

➤ **DESCRIBE TABLE**

Use the **DESCRIBE** command to show the structure of the table, such as column names, constraints on column names, etc. The **DESC** command is a short form of the DESCRIBE command. Both DESCRIBE and DESC commands are equivalent.

**Syntax** The following are the syntax to display the table structure:mysql>

```
DESCRIBE | DESC table_name;
```

**ALTER TABLE Statement**

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table. The ALTER TABLE statement is also used to add and drop various constraints on an existing table.

**ALTER TABLE :**

**-ADD Column/Attribute:**

To add a column in a table, use the following syntax:

```
ALTER TABLE table_name ADD column_name datatype;
```

*Example:*

```
ALTER TABLE Customers ADD Email varchar(255);
```

### **- DROP COLUMN**

To delete a column in a table, use the following syntax

```
ALTER TABLE table_name DROP COLUMN column_name;
```

**Example** ALTER TABLE Customers DROP COLUMN Email;

### **SQL PRIMARY KEY on ALTER TABLE**

To create a PRIMARY KEY constraint on the "ID" column when the table is already created, use the following SQL:

```
ALTER TABLE table_name ADD PRIMARY KEY (Column_name);
```

*Example:*

```
ALTER TABLE Persons ADD PRIMARY KEY (ID);
```

### ***DROP a PRIMARY KEY Constraint***

To drop a PRIMARY KEY constraint, use the following SQL:

```
ALTER TABLE table_name DROP PRIMARY KEY;
```

**Example :** ALTER TABLE Persons DROP PRIMARY KEY;

### **The SQL DROP TABLE Statement**

The DROP TABLE statement is used to drop an existing table in a database.

Syntax **DROP TABLE *table\_name*;**

```
DROP TABLE Shippers;
```

**INSERT INTO Statement:**

The INSERT INTO statement is used to insert new records in a table.

### *INSERT INTO*

*Syntax:*

It is possible to write the INSERT INTO statement in two ways:

1. Specify both the column names and the values to be inserted:

**INSERT INTO *table\_name* (*column1*, *column2*, *column3*, ...) VALUES (*value1*, *value2*, *value3*, ...);**

2. If you are adding values for all the columns of the table, you do not need to specify the column names in the SQL query. However, make sure the order of the values is in the same order as the columns in the table. Here, the INSERT INTO syntax would be as follows:

**INSERT INTO *table\_name* VALUES (*value1*, *value2*, *value3*, ...);**

### **The SQL DELETE Statement:**

The DELETE statement is used to delete existing records in a table.

*DELETE Syntax:*

*DELETE FROM table\_name WHERE condition;*

**Note:** Be careful when deleting records in a table! Notice the WHERE clause in the DELETE statement. The WHERE clause specifies which record(s) should be deleted. If you omit the WHERE clause, all records in the table will be deleted!

The following SQL statement deletes all rows in the "Customers" table, without deleting the table:

*DELETE FROM Customers;*

### **The SQL SELECT Statement**

The SELECT statement is used to select data from a database. The

data returned is stored in a result table, called the result-set.

**SELECT Syntax:** SELECT *column1*, *column2*, ... FROM *table\_name*;

Here, *column1*, *column2*, ... are the field names of the table you want to select data from. If you want to select all the fields available in the table, use the following syntax:

SELECT \* FROM *table\_name*;

### The SQL WHERE Clause:

The WHERE clause is used to filter records.

It is used to extract only those records that fulfill a specified condition.

#### **WHERE Syntax:**

```
SELECT column1, column2, ... FROM table_name WHERE condition;
```

#### Operators in The WHERE Clause

The following operators can be used in the WHERE clause:

Operator	Description
=	Equal
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
<>	Not equal. Note: In some versions of SQL this operator may be written as !=
BETWEEN	Between a certain range
LIKE	Search for a pattern
IN	To specify multiple possible values for a column

### The SQL AND, OR and NOT Operators

The WHERE clause can be combined with AND, OR, and NOT operators.

The AND and OR operators are used to filter records based on more than one condition:

- The AND operator displays a record if all the conditions separated by AND are TRUE.
- The OR operator displays a record if any of the conditions separated by OR is TRUE.
- The NOT operator displays a record if the condition(s) is NOT TRUE.

#### **AND Syntax**

```
SELECT column1, column2, ... FROM table_name WHERE condition1 AND  
condition2 AND condition3 ...;
```

#### **OR Syntax**

```
SELECT column1, column2, ... FROM table_name WHERE condition1 OR condition2  
OR condition3 ...;
```

#### **NOT Syntax**

```
SELECT column1, column2, ... FROM table_name WHERE NOT condition;
```



### **The SQL IN Operator**

The IN operator allows you to specify multiple values in a WHERE clause. The

IN operator is a shorthand for multiple OR conditions.

IN Syntax

```
SELECT column_name(s) FROM table_name WHERE column_name IN (value1, value2, ...);
```

or:

```
SELECT column_name(s) FROM table_name WHERE column_name IN (SELECT STATEMENT);
```

### **The SQL BETWEEN Operator**

The BETWEEN operator selects values within a given range. The values can be numbers, text, or dates.

The BETWEEN operator is inclusive: begin and end values are included.

BETWEEN Syntax

```
SELECT column_name(s)  
FROM table_name  
WHERE column_name BETWEEN value1 AND value2;
```

### **The SQL ORDER BY Keyword**

The ORDER BY keyword is used to sort the result-set in ascending or descending order.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in

descending order, use the DESC keyword.

**ORDER BY Syntax**

```
SELECT column1, column2, ...  
  
FROM table_name  
  
ORDER BY column1, column2, ... ASC|DESC;
```

Example

The following SQL statement selects all customers from the "Customers" table, sorted DESCENDING by the "Country" column:

```
SELECT * FROM Customers ORDER BY Country DESC;
```

#### *ORDER BY Several Columns Example*

The following SQL statement selects all customers from the "Customers" table, sorted by the "Country" and the "CustomerName" column. This means that it orders by Country, but if some rows have the same Country, it orders them by CustomerName:

Eg: `SELECT * FROM Customers ORDER BY Country, CustomerName;`

### SQL Aliases

SQL aliases are used to give a table, or a column in a table, a temporary name.

Aliases are often used to make column names more readable.

An alias only exists for the duration of that query.

An alias is created with the AS keyword.

#### **Alias Column Syntax:**

```
SELECT column_name AS alias_name FROM table_name;
```

#### *Alias Table*

**Syntax:** `SELECT column_name(s) FROM table_name AS alias_name;`

### The SQL UPDATE Statement

The UPDATE statement is used to modify the existing records in a table.

#### **UPDATE Syntax:**

```
UPDATE table_name SET column1 = value1, column2 = value2, ... WHERE  
condition;
```

#### **UPDATE Table**

The following SQL statement updates the first customer (CustomerID = 1) with a newcontact person *and* a new city.

```
UPDATE Customers  
SET ContactName = 'Alfred Schmidt', City= 'Frankfurt'  
WHERE CustomerID = 1;
```

## The SQL SELECT DISTINCT Statement

The SELECT DISTINCT statement is used to return only distinct (different) values.

Inside a table, a column often contains many duplicate values; and sometimes you only want to list the different (distinct) values.

### **SELECT DISTINCT Syntax:**

```
SELECT DISTINCT column1, column2, ...FROM table_name;
```

### *SELECT Example Without DISTINCT*

The following SQL statement selects all (including the duplicates) values from the "Country" column in the "Customers" table:

Eg:            *SELECT Country FROM Customers;*

Now, let us use the    **SELECT DISTINCT statement**

and see the result.

### ***SELECT DISTINCT Examples***

The following SQL statement selects only the DISTINCT values from the "Country" column in the "Customers" table:

```
SELECT DISTINCT Country FROM Customers;
```

The following SQL statement lists the number of different (distinct) customer countries:

```
SELECT COUNT(DISTINCT Country) FROM Customers;
```

## The SQL LIKE Operator

The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

There are two wildcards often used in conjunction with the LIKE operator:

- The percent sign (%) represents zero, one, or multiple characters
- The underscore sign (\_) represents one, single character

The percent sign and the underscore can also be used in combinations!

### *LIKE Syntax*

```
SELECT column1, column2, ...
```

FROM *table\_name*

WHERE *columnN* LIKE *pattern*;

LIKE	Operator Description
WHERE CustomerName LIKE 'a%'	Finds any values that start with "a"
WHERE CustomerName LIKE '%a'	Finds any values that end with "a"
WHERE CustomerName LIKE '%or%'	Finds any values that have "or" in any position
WHERE CustomerName LIKE '_r%'	Finds any values that have "r" in the second position
WHERE CustomerName LIKE 'a_%'	Finds any values that start with "a" and are at least 2 characters in length
WHERE CustomerName LIKE 'a__%'	Finds any values that start with "a" and are at least 3 characters in length
WHERE ContactName LIKE 'a%o'	Finds any values that start with "a" and ends with "o"

### **What is a NULL Value?**

A field with a NULL value is a field with no value.

If a field in a table is optional, it is possible to insert a new record or update a record without adding a value to this field. Then, the field will be saved with a NULL value.

#### *How to Test for NULL Values?*

It is not possible to test for NULL values with comparison operators, such as =, <, or >.

We will have to use the IS NULL and IS NOT NULL operators instead.

IS NULL Syntax

```
SELECT column_names FROM table_name WHERE column_name IS NULL;
```

#### ***IS NOT NULL Syntax***

```
SELECT column_names FROM table_name WHERE column_name IS NOT NULL;
```

#### ***The IS NULL Operator***

The IS NULL operator is used to test for empty values (NULL values).

The following SQL lists all customers with a NULL value in the "Address" field:

```
SELECT CustomerName, ContactName, Address
```

```
FROM Customers
```

WHERE Address IS NULL;

### ***The IS NOT NULL Operator***

The IS NOT NULL operator is used to test for non-empty values (NOT NULL values).

The following SQL lists all customers with a value in the "Address" field:

```
SELECT CustomerName, ContactName, Address
```

```
FROM Customers
```

```
WHERE Address IS NOT NULL;
```

# 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 third parameter 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('ABCDEFGHJKLMNOP', -2,-1);
+-----+
| MID('ABCDEFGHJKLMNOP', -2,-1) |
+-----+
|                                |
+1 row in set (0.00
sec)

```

```

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

```

**(Please note the output of example 3, 4 )**

```

5) mysql>SELECT MID('ABCDEFGHJKLMNOP', 3,4);
+-----+
| MID('ABCDEFGHJKLMNOP', 3,4) |
+-----+
| CDEF                          |
+1 row in set (0.00 sec)

```

```

6) mysql>SELECT MID('ABCDEFGHJKLMNOP', -4,2);
+-----+
| MID('ABCDEFGHJKLMNOP', -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('ABCDEFGHJKLMNOP', 3,4);
+-----+
| SUBSTRING('ABCDEFGHJKLMNOP', 3,4) |
+-----+
| CDEF                              |
+1 row in set (0.00 sec)

```

```

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

```

3) mysql>SELECT SUBSTRING('ABCDEFGHJKLMNOP', 1,4);

```
+-----+
| SUBSTRING('ABCDEFGHJKLMNOP', 1,4) |
+-----+
| ABCD                               |
+-----+
```

+1 row in set (0.00 sec)

4) mysql>SELECT SUBSTRING('ABCDEFGHJKLMNOP', 4,2);

```
+-----+
| SUBSTRING('ABCDEFGHJKLMNOP', 4,2) |
+-----+
| DE                                 |
+-----+
```

+1 row in set (0.00 sec)

5) mysql>SELECT SUBSTRING('ABCDEFGHJKLMNOP', -4,2);

```
+-----+
| SUBSTRING('ABCDEFGHJKLMNOP', -4,2) |
+-----+
| MN                                 |
+-----+
```

+1 row in set (0.00 sec)

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

Examples:

1) mysql>SELECT SUBSTR('ABCDEFGHJKLMNOP', -4,3);

```
+-----+
| SUBSTR('ABCDEFGHJKLMNOP', -4,3) |
+-----+
| MNO                               |
+-----+
```

+1 row in set (0.00 sec)

2) mysql>SELECT SUBSTR('ABCDEFGHJKLMNOP', 1,3);

```
+-----+
| SUBSTR('ABCDEFGHJKLMNOP', 1,3) |
+-----+
| ABC                               |
+-----+
```

+1 row in set (0.00 sec)

3) mysql>SELECT SUBSTR('ABCDEFGHJKLMNOP', 4,3);

```
+-----+
| SUBSTR('ABCDEFGHJKLMNOP', 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('ABCDEFGHJKLMNOP',1);
```

```
+-----+
| LEFT('ABCDEFGHJKLMNOP',1) |
+-----+
| A                           |
+-----+
+1 row in set (0.00 sec)
```

```
2) mysql> SELECT LEFT('ABCDEFGHJKLMNOP',2);
```

```
+-----+
| LEFT('ABCDEFGHJKLMNOP',2) |
+-----+
| AB                          |
+-----+
+1 row in set (0.00 sec)
```

```
3) mysql> SELECT LEFT('ABCDEFGHJKLMNOP',3);
```

```
+-----+
| LEFT('ABCDEFGHJKLMNOP',3) |
+-----+
| ABC                          |
+-----+
+1 row in set (0.00 sec)
```

```
4) mysql> SELECT LEFT('ABCDEFGHJKLMNOP',-1);
```

```
+-----+
| LEFT('ABCDEFGHJKLMNOP',-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('ABCDEFGHJKLMNOP',1);`

```
+-----+
| RIGHT('ABCDEFGHJKLMNOP',1) |
+-----+
| P                           |
+-----+
```

+1 row in set (0.00 sec)

(Extracting 1 character)

- 2) `mysql> SELECT RIGHT('ABCDEFGHJKLMNOP',2);`

```
+-----+
| RIGHT('ABCDEFGHJKLMNOP',2) |
+-----+
| OP                           |
+-----+
```

+1 row in set (0.00 sec)

(Extracting 2 characters)

- 3) `mysql> SELECT RIGHT('ABCDEFGHJKLMNOP',3);`

```
+-----+
| RIGHT('ABCDEFGHJKLMNOP',3) |
+-----+
| NOP                           |
+-----+
```

+1 row in set (0.00 sec)

- 4) `mysql> SELECT RIGHT('ABCDEFGHJKLMNOP',4);`

```
+-----+
| RIGHT('ABCDEFGHJKLMNOP',4) |
+-----+
| MNOP                           |
+-----+
```

+1 row in set (0.00 sec)

- 5) `mysql> SELECT RIGHT('ABCDEFGHJKLMNOP',-1);`

```
+-----+
| RIGHT('ABCDEFGHJKLMNOP',-1) |
+-----+
```

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

Examples:

- 1) `mysql> SELECT INSTR('ABCDEFGHJKLMNOP','ABC');`

```
+-----+
| INSTR('ABCDEFGHJKLMNOP','ABC') |
+-----+
| 1                               |
+-----+
```

+1 row in set (0.00 sec)

- 2) mysql> SELECT INSTR('ABCDEFGHIJKLMNQP','BC');
- ```

+-----+
| INSTR('ABCDEFGHIJKLMNQP','BC') |
+-----+
|                2                |
+-----+
+1 row in set (0.00 sec)

```
- 3) mysql> SELECT INSTR('ABCDEFGHIJKLMNQP','EFG');
- ```

+-----+
| INSTR('ABCDEFGHIJKLMNQP','EFG') |
+-----+
|                5                |
+-----+
+1 row in set (0.00 sec)

```
- 4) mysql> SELECT INSTR('ABCDEFGHIJKLMNQP','QRST');
- ```

+-----+
| INSTR('ABCDEFGHIJKLMNQP','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	<p><b>NOW():</b>- Function that returns the current date and time.</p> <pre>mysql&gt; select now(); +-----+   now()   +-----+   2022-09-04 12:21:25   +-----+ 1 row in set (0.08 sec)</pre>
2	<p><b>DATE():</b>- This function returns the date part from Date and time.</p> <pre>mysql&gt; select date(now()); +-----+   date(now())   +-----+   2022-09-04   +-----+ 1 row in set (0.35 sec)</pre>
3	<p><b>MONTH()</b> returns the month part of a date.</p> <pre>mysql&gt; select month(now()); +-----+   month(now())   +-----+            9   +-----+ 1 row in set (0.08 sec)</pre>
4	<p><b>MONTHNAME()</b> :-gives month name from a date.</p> <pre>mysql&gt; select monthname(now()); +-----+   monthname(now())   +-----+   September   +-----+</pre>
5	<p><b>YEAR():</b>- Date function returns year part of a date.</p> <pre>mysql&gt; select year(now()); +-----+   year(now())   +-----+</pre>
6	<p><b>DAY():</b>- Day function provide the day part of Date.</p> <pre>mysql&gt; select day('2022-04-23'); +-----+   day('2022-04-23')   +-----+</pre>
7	<p><b>DAYNAME():</b>- Returns the weekday name of a date.</p> <pre>mysql&gt; select dayname('2022/08/23'); +-----+   dayname('2022/08/23')   +-----+</pre>

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.**

Consider the following table named student.

S1_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 displayed 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 teaching **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**

- 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
- Prachi has given the following command to obtain the highest marks  
 Select 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. To display the dob of the youngest fan.

**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 is more 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.

- a. `SELECT * FROM FANS ORDER BY FAN_DOB DESC;`
- b. `SELECT FAN_MODE, COUNT(*) FROM FANS GROUP BY FAN_MODE;`
- c. `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","rmatcs");
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();

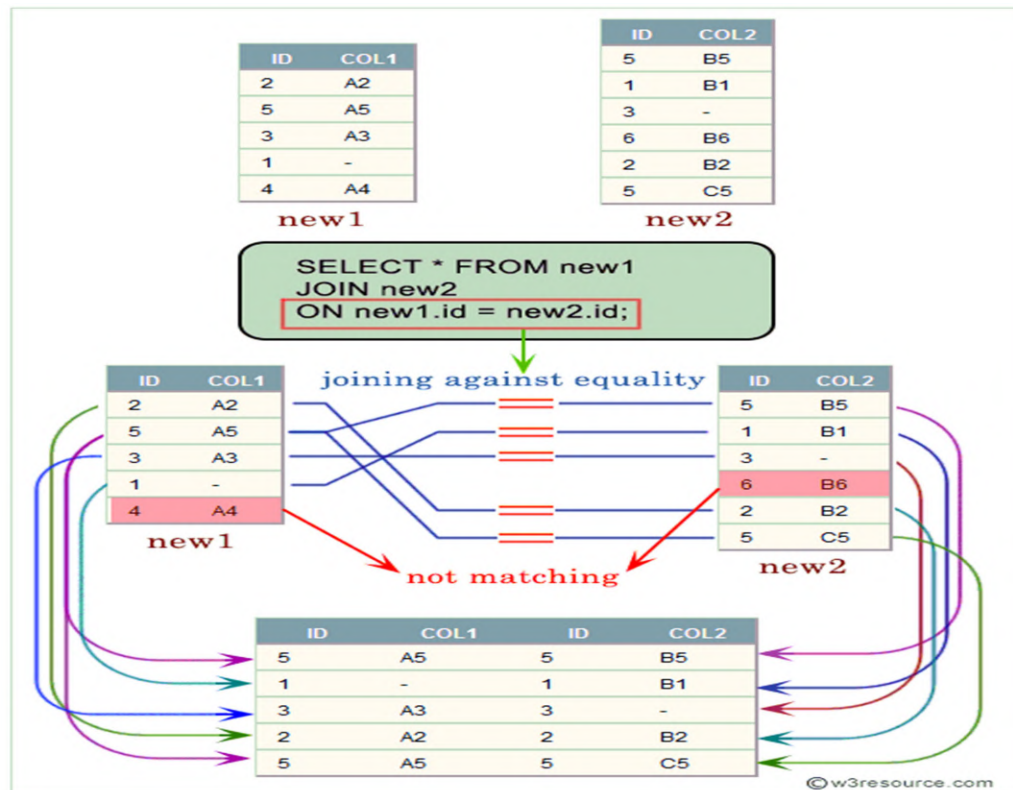
## EQUI JOIN

What is Equi Join in SQL?

SQL EQUI JOIN performs a JOIN against equality or matching column(s) values of the associated tables. An equal sign (=) is used as comparison operator in the where clause to refer equality.

You may also perform EQUI JOIN by using JOIN keyword followed by ON keyword and then specifying names of the columns along with their associated tables to check equality.

**Pictorial presentation of SQL Equi Join:**



**Syntax:**

```
SELECT column_list FROM table1, table2....WHERE  
table1.column_name = table2.column_name;
```

or

```
SELECT * FROM table1 JOIN table2[ON (join_condition)];
```

**Example:**

Here is an example of Equi Join in SQL.

**Table name — Student**

In this table, you have I'd, name, class and city are the fields.

Select \* from Student;

id	name	class	city
3	Hina	3	Delhi
4	Megha	2	Delhi
6	Gouri	2	Delhi

**Table name — Record**

In this table, you have I'd, class and city are the fields.

Select \* from Record;

id	class	city
9	3	Delhi
10	2	Delhi
12	2	Delhi

**Example –**

```
SELECT student.name, student.id, record.class, record.city  
FROM student, record  
WHERE student.city = record.city;
```

**or**

```
SELECT student.name, student.id, record.class, record.city  
FROM student  
JOIN record  
ON student.city = record.city;
```

**Output :**

name	id	class	city
Hina	3	3	Delhi
Megha	4	3	Delhi
Gouri	6	3	Delhi
Hina	3	2	Delhi

name	id	class	city
Megha	4	2	Delhi
Gouri	6	2	Delhi
Hina	3	2	Delhi
Megha	4	2	Delhi
Gouri	6	2	Delhi

Q1. Consider the following tables:

**Table: Doctors**

DocID	DocName	Department
101	J K Mishra	Ortho
102	Mahesh tripathi	ENT
103	Ravi Kumar	Neuro
104	Mukesh Jain	Physio
105	Gita Vijay	Ortho

**Table : Patients**

PatNo	PatName	Department	DocID
1	Payal	ENT	102
2	Naveen	Ortho	101
3	Rakesh	Neuro	103
4	Atul	Physio	104
5	Rahul	Ortho	105

**Write queries for the following:**

1. Display the Doctor name of Payal
2. Display the doctors and patients in Ortho department
3. Display the number of patients in each department

**Write output for the following queries:**

4. Select DocName, PatName from Doctors D, Patients P where D.DocID=P.DocID;
5. Select DocName from Doctors order by Department;
6. Select D.DocID, DocName, PatName from Doctors D, Patients P where D.DocID=P.DocID and D.DocID=103;

Q2. Consider the following tables

**Table: TECH\_COURSE**

CID	CNAME	FEES	STARTDATE	TID
C201	Animation and VFX	12000	7/2/2022	101
C202	CADD	15000	11/15/2021	NULL
C203	DCA	10000	10/1/2020	102
C204	DDTP	9000	9/15/2021	104
C205	App Development	18000	2022-11-01	101
C206	Digital marketing	16000	7/25/2022	103

**Table : CENTRE**

TID	CITY
101	KANNUR
102	CALICUT
104	THRISSUR
105	ERNAKULAM
103	TRIVANDRUM

**Write output for the following queries:**

- Select tid, count(\*), min(fees) from tech\_course group by tid having count(id)>1;
- Select cname from tech\_course where fees>15000 order by cname;
- Select avg(fees) from tech\_course where fees between 15000 and 17000;
- Select CNAME, CITY from tech\_course, centre where tech\_course.tid=centre.tid;
- Select centre.TID, sum(fees) from tech\_course, centre where tech\_course.tid=centre.tid group by centre.TID;

**Answers**

**Q1.**

- Select DocName from Doctors D, Patients P where D.DocID=P.DocID and PatName='Payal';
- Select DocName, PatName from Doctors D, Patients P where D.DocID=P.DocID and D.Department='Ortho';
- Select Department, count(PatName) from Patients group by Department;

4.

DocName	PatName
Mahesh tripathi	Payal
J K Mishra	Naveen
Ravi Kumar	Rakesh
Mukesh Jain	Atul
Gita Vijay	Rahul

5.

DocName
Mahesh tripathi
Ravi Kumar
J K Mishra
Gita Vijay

Mukesh Jain

6.

DocID	DocName	PatName
103	Ravi Kumar	Rakesh

Q2.

a.

tid	count(*)	min(fees)
101	2	12000

b.

cname
App Development
Digital Marketing

c.

avg(fees)
15500

d.

CNAME	CITY
Animation and VFX	KANNUR
DCA	CALICUT
DDTP	THRISSUR
App Development	KANNUR
Digital Marketing	TRIVANDRUM

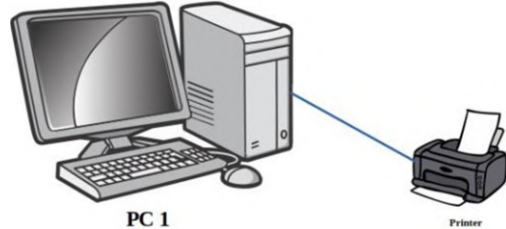
e.

TID	sum(fees)
101	30000
102	10000
103	16000
104	9000

## Unit 3

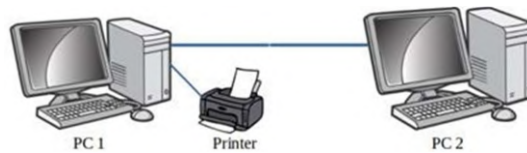
# Introduction to Computer Networks

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 from peripheral 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 use computing power for data processing by other systems that are part of the network.
- **Multuser 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 are distinguished 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

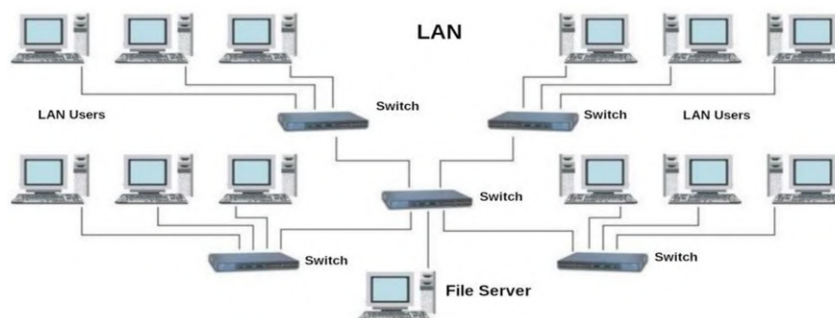
A Personal Area Network (PAN) allows devices to exchange data over short distances. PAN combines devices such as mice, keyboards, printers, smartphones, tablets, etc. The most common connection technology is Bluetooth. Bluetooth can give a range of upto 10metres.



#### LAN

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

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 as Ethernet.

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 Km**

### MAN

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 important differences:

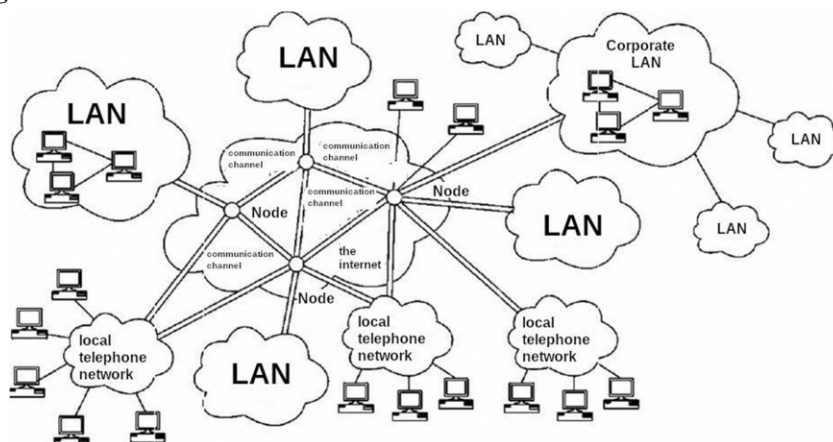
management of local networks and provision of access to the inter-network data transmission environment is carried out by various organizations;

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.**



## 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 a computer 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.

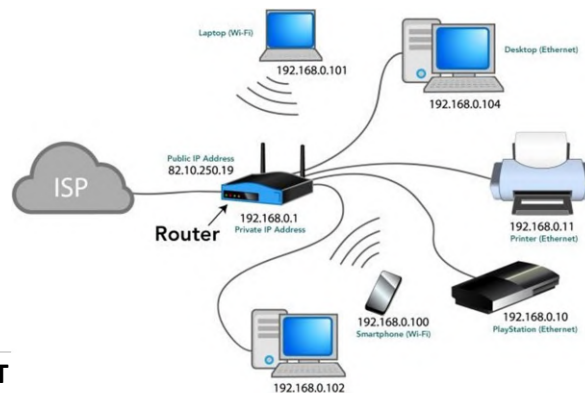
## **Hub**

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 private or 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 communication 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 it is software installed on a router or computer. The network gateway must understand all the protocols used by the router.



laptops and other devices to a shared local network. For example, take a company with several departments 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 to outsiders. For large video surveillance systems, switches are also needed. Switches are also used at home.



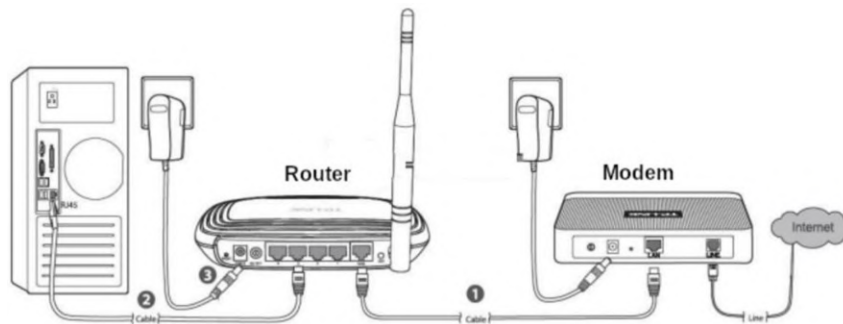
Switch is also a network device used to connect multiple devices together like Hub. But the difference between the hub and switch is that hub forward the received messages to all the connecting devices and switch forward the message to the intended device only. So switch is known as the intelligent device.

## 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 directions at 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 and transmits 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) and symbolic (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 ensures that 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 the Physical 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 from each 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 255 and 0.

If your computer is connected to a local network or the Internet, you can find out its IP address and subnet mask 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 without special 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 of the 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 100meters. 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:
- Router
  - Repeater
  - Gateway
  - HUB
7. The connector used for networking is:
- RJ - 11
  - RI – 11
  - RJ - 45
  - 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:**

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

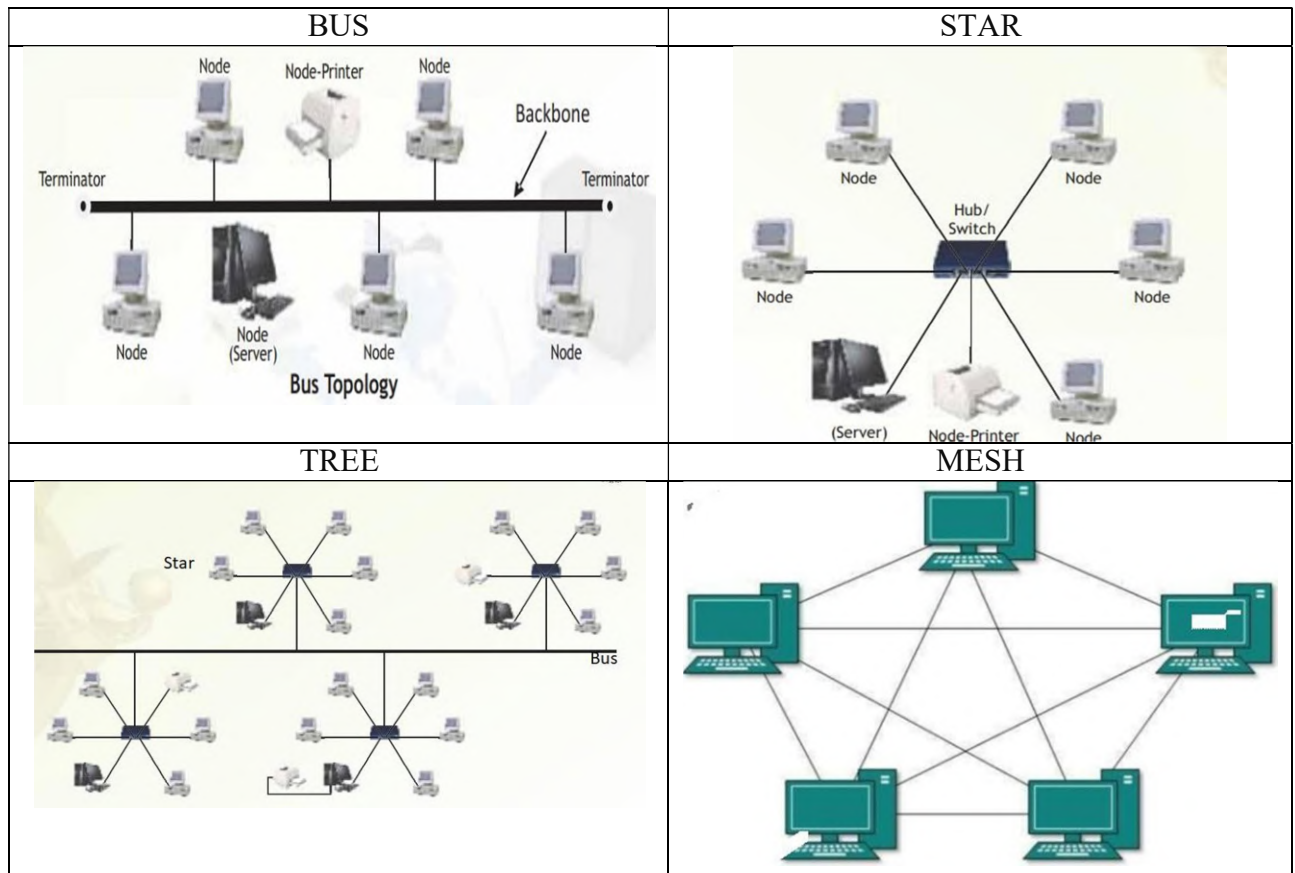
In this networking topology, each communicating device is connected with every other device in the network. To build a fully connected mesh topology of n nodes, requires  $n(n-1)/2$  wires.

### **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



## 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 appliances like 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.

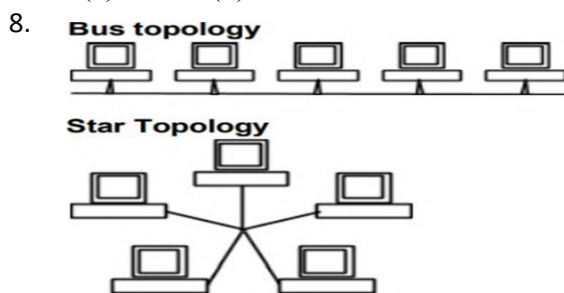
### Questions:

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 . <http://www.cbse.nic.in/> <http://welcome.htm> . <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 the people.
  - 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



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-media files

## Difference between Website and Webpage

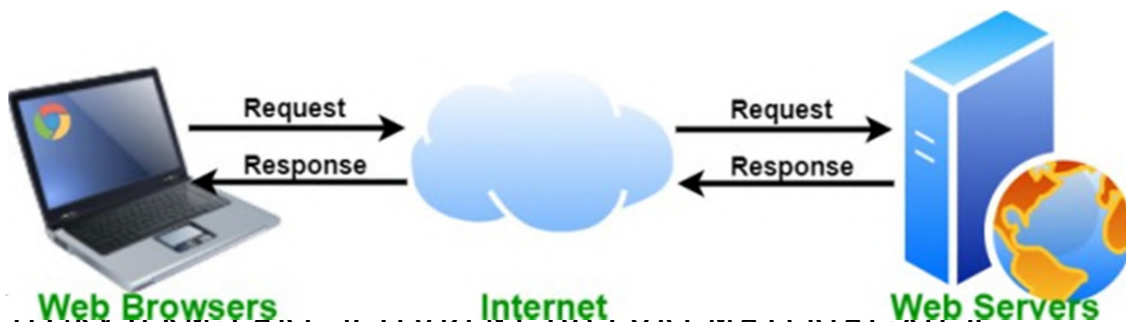
Website	WebPage
A collection of web pages which are grouped together and usually connected together in various ways, Often called a "web site" or simply a "site." Eg: CBSE website	A document which can be displayed in a web browser such as Firefox, Google Chrome, Opera, Microsoft Internet Explorer etc Result web page of CBSE
Contains information about various topics	Contains 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 in all time	The page content changes according to 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 a client sends a request for a web page, the web server searches for the requested page. If the requested page is found, it will send it to the client with an HTTP response. If the requested web page is not found, the web server will 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 any interruption 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 also can 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 \_\_\_\_\_
3. (a) Home page (b) Webpage (c) Webserver (d) Email
4. Which of the following is not a web browser?  
(a) Google Chrome (b) Mozilla Firefox (c) Opera (d) MS word
5. Which of the following is a web browser?

(a) Adobe Photoshop (b) Coral Draw (c) Apple Safari (d) MS word

6. Which of the following button allows you to move to the previously visited page on the browser?  
a) Back (b) Previous (c) Last (d) Reverse
7. Which of the following is piece of information stored in a form of a text file and that helps in customizing the displayed information, login, showing data based on user's interests from the web site?  
(a) Extension (b) Cookies (c) Login (d) Session
8. The space provided by a service provider to store website data is called \_\_\_\_\_.  
(a) Webspaces (b) Cloud Computing (c) Web Hosting (d) Web Store
9. \_\_\_\_\_ is an online service that enables you to publish your website or web application on the internet  
(a) Web server (b) Web Browser (c) Web Hosting (d) None
10. \_\_\_\_\_ is a software component that adds a specific feature to an existing computer program  
(a) Addon (b) Plug in (c) Cookies (d) All of the above
11. The first page on the website that allows you to navigate to other pages by menus or links is known as \_\_\_\_\_  
(a) front page (b) primary page (c) Home page (d) None

### Fill 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 all time is known as \_\_\_\_\_.
3. The \_\_\_\_\_ of a website are linked together with different hyperlinks and share a common 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 7.c 8.c 9.b 10.c

#### Fill in the blanks:

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



## Descriptive Questions and answers:

1. Differentiate between web browser and web server  
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 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 webpage  
Home 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 in all time	The page content changes according to 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 hosted on a web server	A document that uses HTTP	The top level page of 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



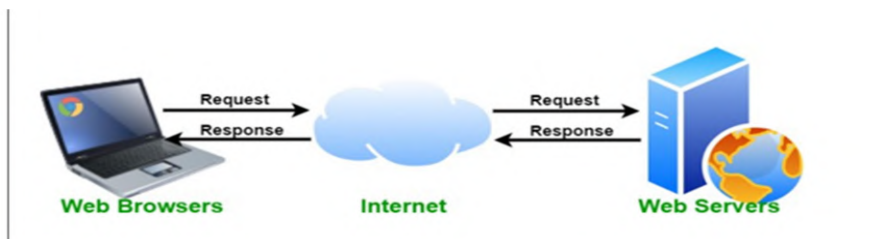
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Content changes rarely	Content changes frequently
Less complex	Complex

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Software add-on are common for games, wordprocessing and accounting programs. Software add-ons will integrate to the browser and it only run when the browser runs.

**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.

Multiple choice questions:

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8. \_\_\_\_\_ is an online service that enables you to publish your website or web application on the internet  
(a) Web server (b) Web Browser (c) Web Hosting (d) None
9. \_\_\_\_\_ is a software component that adds a specific feature to an existing computer program  
(a) Add on (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 menu or links is known as \_\_\_\_\_  
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Fill in the blanks questions:-

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3. The \_\_\_\_\_ of a website are linked together with different hyperlinks and share a common 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 \_\_\_\_\_
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:

1. Website 2. Web server 3. Web pages 4. HTML and scripting languages
5. Web Hosting 6. Web browser

### Descriptive Questions and answers:-

1. Differentiate between web browser and web server 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 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 web page and home page?

Web page:- A document created usually using HTML and resides on a website is called webpage

Home page:-It is the first page that gets displayed when we open a website

3. Differentiate between dynamic and static webpages?

Static webpage content is constant in all time	The page content changes according to 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 frequently

4. Write the steps to host a website::

Following steps needs to followed to host a website:

- Go and search for the hosting provider companies online
- Find a suitable domain name for your website
- Register your domain name with the Domain Name Registrar
- Once you get to space, create your login
- Upload your local host website files on the allocated space
- Map you domain name with IP address

5. What are the components of a web site? Explain in detail.

- Webhosting – A space or computer provided by a service provider to store website data
- Address – A unique URL rendered by the browser when the request sent by the user
- Homepage – The first page of a website when the website is launched
- Design – The theme and interface design including the layout of the website
- Content – The text, images, links, and other media files included in the web page
- Navigation Structure – A structure that navigates from one page to another

6. Explain the following terms:

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

<b>Web Site</b>	<b>Web Page</b>	<b>Home Page</b>	<b>Web Server</b>
Group of related web pages hosted on a web server	A document that uses HTTP	The top level page of web site	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)

# 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**

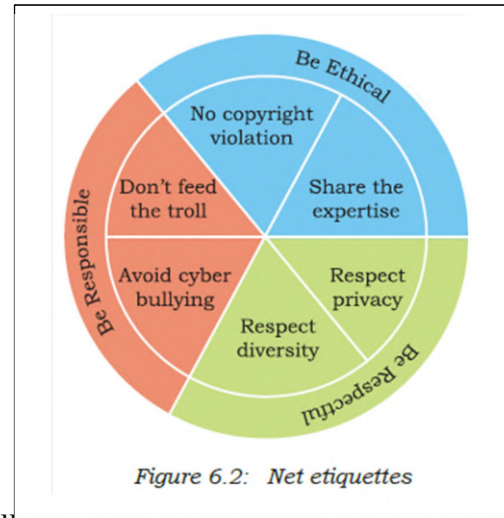
- Using fitness trackers
- Using apps to receive healthcare

### **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



## **DATA PROTECTION**

Data protection is a set of strategies and processes you can use to secure the privacy, authenticity, 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 irrelevant 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 source licence 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 \_\_\_\_\_ are the permissions given to use a product or someone's creation 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 jeopardise 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?

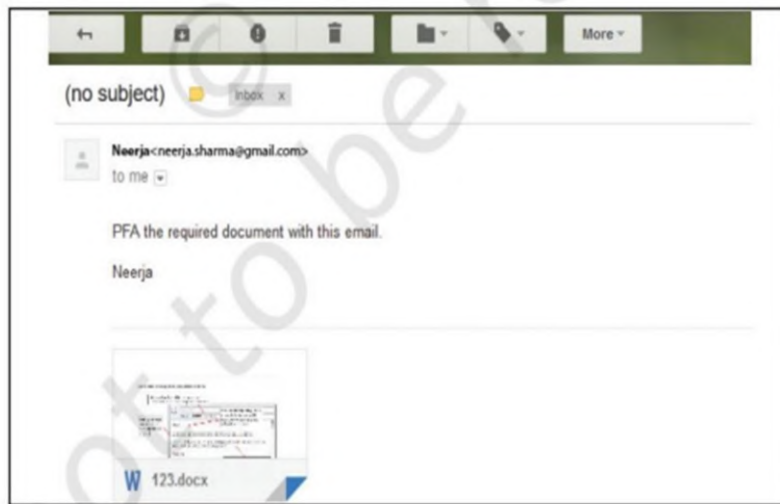
- a) You sent an email to your friend with a message saying that "I am sorry".
- b) You sent a threatening message to your friend saying "Do not try to call or talk to me".
- c) You created an embarrassing picture of your friend and uploaded on your account on a social networking site.

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.





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?

This type of activity is called 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 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 Etiquettes? Explain any two such etiquettes.

Net Etiquettes 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, degrading or 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**

(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: <b>select mid('Informatics Practices', -9);</b>	1			
5	If a column "Mark" in student table contains the following data <table border="1" data-bbox="240 1801 391 1915"><tr><td>MARK</td></tr><tr><td>22</td></tr><tr><td>NULL</td></tr></table>	MARK	22	NULL	1
MARK					
22					
NULL					

	<div style="border: 1px solid black; display: inline-block; padding: 2px;">21</div> <div style="border: 1px solid black; display: inline-block; padding: 2px;">23</div> <p>Predict the output of the following command:</p> <p>SELECT AVG (MARK) FROM student;</p> <ol style="list-style-type: none"> <li>i. 22</li> <li>ii. 16.5</li> <li>iii. NULL</li> <li>iv. 66</li> </ol>	
6	<p>'F' in FOSS stands for:</p> <ol style="list-style-type: none"> <li>i. Force</li> <li>ii. Free</li> <li>iii. Fibre</li> <li>iv. First</li> </ol>	1
7	<p>Which SQL statement is used to display all the data from product table in the decreasing order of price?</p> <ol style="list-style-type: none"> <li>i. SELECT * FROM PRODUCT;</li> <li>ii. SELECT * FROM PRODUCT ORDER BY PRICE;</li> <li>iii. SELECT * FROM PRODUCT ORDER BY PRICE DESC;</li> <li>iv. SELECT * FROM PRODUCT ORDER BY DESC;</li> </ol>	1
8	<p>The number of rows in a relation in SQL is known as</p> <ol style="list-style-type: none"> <li>i. cardinality</li> <li>ii. degree</li> <li>iii. tuple</li> <li>iv. attribute</li> </ol>	1
9	<p>Which among the following is a DDL command in SQL?</p> <ol style="list-style-type: none"> <li>i. SELECT</li> <li>ii. INSERT</li> <li>iii. ALTER</li> <li>iv. UPDATE</li> </ol>	1
10	<p>To display last three rows of a series object 'S', you may write:</p> <ol style="list-style-type: none"> <li>i. S.Head()</li> <li>ii. S.Tail(3)</li> <li>iii. S.Head(3)</li> <li>iv. S.tail()</li> </ol>	1
11	<p>Which of the following statement will import matplotlib.pyplot library?</p> <ol style="list-style-type: none"> <li>i. Import pyplot as pd</li> <li>ii. import matplotlib as py</li> <li>iii. import matplotlib.pyplot as plt</li> <li>iv. All of these</li> </ol>	1
12	<p>Which of the following can be used to specify the data while creating a DataFrame?</p> <ol style="list-style-type: none"> <li>i. Series</li> <li>ii. List of Dictionaries</li> <li>iii. Structured ndarray</li> <li>iv. All of these</li> </ol>	1
13	<p>_____ protocol allows us to have voice call (telephone service) over the Internet</p>	1



14	Write the output of the following SQL command: SELECT ROUND(199.2936, 1);	1												
15	Removal of parts containing the valuable items in E waste management is? i. Refurbishment and reuse ii. Dismantling iii. Recycling iv. None of these	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	<b>Assertion (A):</b> - The Internet is a collection of interconnected computer networks linked by transmission medium such as copper wires, fiber-optic cables, wireless connections etc  <b>Reasoning (R):</b> - World wide web is a collection of interconnected documents	1												
18	<b>Assertion (A):</b> - DataFrame has both a row and column index.  <b>Reasoning (R):</b> - A DataFrame is a two-dimensional labelled data structure like a table of MySQL.	1												
<b>SECTION B</b>														
19	Distinguish between LAN and WAN. OR Explain the function of the following network devices: a. Modem b. Firewall	2												
20	Write SQL commands: - a. To print the length of the string "Happy Holidays" b. To print the string "Happy Holidays" in capital letters.	2												
21	Differentiate between DDL and DML commands	2												
22	Consider a given Series ,S1 with subject and marks where subject is index. <table border="1" style="margin-left: auto; margin-right: auto;"><thead><tr><th>Subject</th><th>Marks</th></tr></thead><tbody><tr><td>ENG</td><td>76</td></tr><tr><td>HINDI</td><td>88</td></tr><tr><td>MATH</td><td>60</td></tr><tr><td>SCI</td><td>85</td></tr><tr><td>SST</td><td>81</td></tr></tbody></table> Write a program in Python Pandas to create the series.	Subject	Marks	ENG	76	HINDI	88	MATH	60	SCI	85	SST	81	2
Subject	Marks													
ENG	76													
HINDI	88													
MATH	60													
SCI	85													
SST	81													

23	Write down different steps of E waste Disposal. OR Mention any four net etiquettes.	2																												
24	What will be the output of the following code:  <pre>&gt;&gt;&gt;import pandas as pd &gt;&gt;&gt;A=pd.Series(data=[12,20,5,50]) &gt;&gt;&gt;print(A&gt;10)</pre>	2																												
25	Carefully observe the following code:  <pre>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)</pre> <p>Answer the following:</p> <ol style="list-style-type: none"> <li>List the index of the DataFrame df</li> <li>List the column names of DataFrame df.</li> </ol>	2																												
<b>SECTION C</b>																														
26	Consider the table SPORTS given below:  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SCode</th> <th>SportName</th> <th>Noofplayers</th> <th>Coachname</th> </tr> </thead> <tbody> <tr> <td>S001</td> <td>Cricket</td> <td>21</td> <td>Rahul Dravid</td> </tr> <tr> <td>S002</td> <td>Football</td> <td>25</td> <td>Roshan Lal</td> </tr> <tr> <td>S003</td> <td>Hockey</td> <td>40</td> <td>Sardar Singh</td> </tr> <tr> <td>S004</td> <td>Cricket</td> <td>19</td> <td>Chetan Sharma</td> </tr> <tr> <td>S005</td> <td>Archery</td> <td>12</td> <td>Limbaram</td> </tr> <tr> <td>S006</td> <td>Shooting</td> <td>17</td> <td>Deepika Kumari</td> </tr> </tbody> </table> <p>a. Give output of following SQL command Select Coachname from SPORTS Order By Coachname desc;</p> <p>Write SQL commands to:</p> <ol style="list-style-type: none"> <li>Write SQL command to display the total number of players in each sports.</li> <li>Write SQL command to display sports name where the total number of players is more than 25</li> </ol>	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	3
SCode	SportName	Noofplayers	Coachname																											
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S004	Cricket	19	Chetan Sharma																											
S005	Archery	12	Limbaram																											
S006	Shooting	17	Deepika Kumari																											
27	Write a Python code to create a DataFrame with appropriate column headings from the list given below:  <pre>[[101,'Ram',2500],[102,'Ann',5000],[103,'Sam' ,8000],[104,'Manu',4000]]</pre>	3																												
28	Consider the data frame and answer the questions	3																												

	<table border="1"> <thead> <tr> <th></th> <th>TCS</th> <th>Wipro</th> <th>Infosys</th> <th>IP</th> </tr> </thead> <tbody> <tr> <td>Qtr1</td> <td>80</td> <td>88</td> <td>66</td> <td>74</td> </tr> <tr> <td>Qtr2</td> <td>98</td> <td>67</td> <td>75</td> <td>98</td> </tr> <tr> <td>Qtr3</td> <td>77</td> <td>93</td> <td>89</td> <td>92</td> </tr> <tr> <td>Qtr4</td> <td>65</td> <td>50</td> <td>40</td> <td>80</td> </tr> </tbody> </table> <p>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])</p>		TCS	Wipro	Infosys	IP	Qtr1	80	88	66	74	Qtr2	98	67	75	98	Qtr3	77	93	89	92	Qtr4	65	50	40	80																																																					
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Qtr4	65	50	40	80																																																																											
29	<p>What is IT Act 2000? What is its importance?  OR  What do you understand by plagiarism? Why is it a punishable offence? Mention any two ways to avoid plagiarism.</p>	3																																																																													
30	<p>Identify the SQL functions to perform the following:  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”);</p> <p>OR</p> <p>Differentiate between where and having clause with the help of suitable example</p>	3																																																																													
<b>SECTION D</b>																																																																															
31	<p>Consider the following table STUDENT. Write SQL commands for the following statements.</p> <table border="1"> <thead> <tr> <th>Rollno</th> <th>Name</th> <th>Dob</th> <th>Class</th> <th>Gender</th> <th>Hobby</th> <th>Fees</th> </tr> </thead> <tbody> <tr> <td>1001</td> <td>BHAVYA</td> <td>2001-01-02</td> <td>11</td> <td>F</td> <td>Painting</td> <td>100</td> </tr> <tr> <td>1002</td> <td>AARDRA</td> <td>2002-10-21</td> <td>1</td> <td>F</td> <td>Drama</td> <td>200</td> </tr> <tr> <td>1003</td> <td>AJITH</td> <td>2004-12-11</td> <td>8</td> <td>M</td> <td>Cooking</td> <td>150</td> </tr> <tr> <td>1004</td> <td>ARJUN</td> <td>2001-02-22</td> <td>10</td> <td>M</td> <td>Cooking</td> <td>250</td> </tr> <tr> <td>1005</td> <td>KAVYA</td> <td>2005-10-12</td> <td>8</td> <td>F</td> <td>Sports</td> <td>100</td> </tr> <tr> <td>1006</td> <td>ANAND</td> <td>2000-02-01</td> <td>1</td> <td>M</td> <td>Drama</td> <td>120</td> </tr> <tr> <td>1007</td> <td>ATHUL</td> <td>2006-10-11</td> <td>6</td> <td>M</td> <td>Sports</td> <td>150</td> </tr> <tr> <td>1008</td> <td>NEERAJA</td> <td>2003-11-21</td> <td>9</td> <td>F</td> <td>Sports</td> <td>100</td> </tr> <tr> <td>1009</td> <td>REHNA</td> <td>2003-08-07</td> <td>8</td> <td>F</td> <td>Painting</td> <td>NULL</td> </tr> <tr> <td>1010</td> <td>VAISAKH</td> <td>2001-12-11</td> <td>10</td> <td>M</td> <td>Cooking</td> <td>120</td> </tr> </tbody> </table> <p>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</p>	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	5
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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**

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

**| Number of Computers**

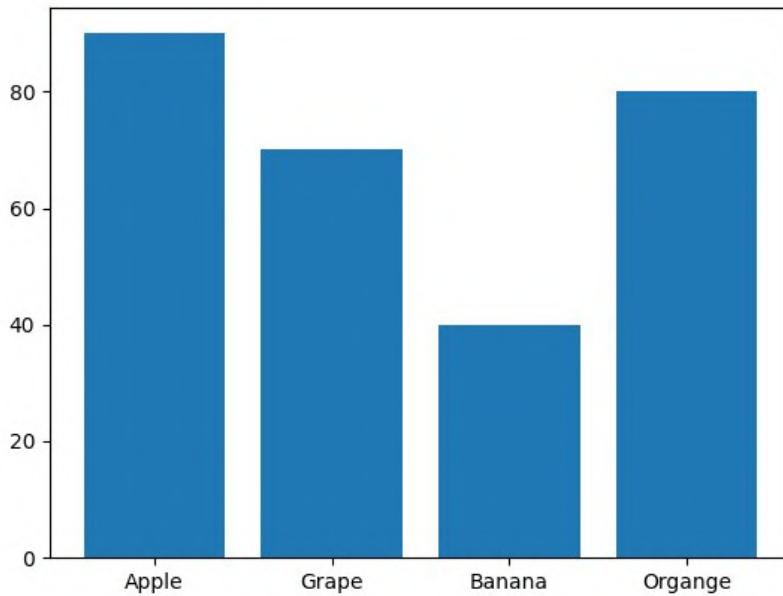
Block A	25
Block B	50
Block C	125
Block D	10

- 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

- Write SQL commands to :
- Display the minimum and maximum marks obtained by female students
- Display different Cities(without repetition) available in table
- 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**

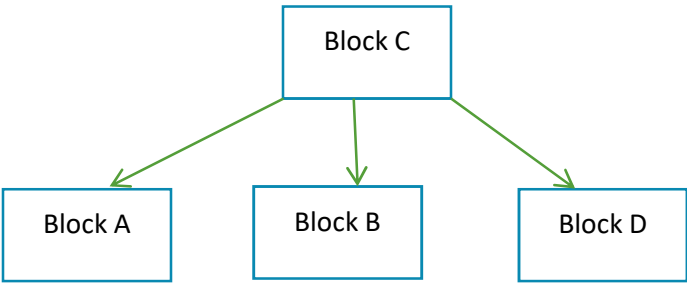
**Time: 3 hrs**

SECTION A			
1	i. Repeater 1 mark for correct answer	1	
2	iv. Stealing of user name and password and misusing others Email 1 mark for correct answer	1	
3	iv. Empty cola cans 1 mark for correct answer	1	
4	Practices 1 mark for correct answer	1	
5	i. 22 1 mark for correct answer	1	
6	ii. Free 1 mark for correct answer	1	
7	iii. SELECT * FROM PRODUCT ORDER BY PRICE DESC; 1 mark for correct answer	1	
8	i. cardinality 1 mark for correct answer	1	
9	iii. ALTER 1 mark for correct answer	1	
10	ii. S.Tail(3) 1 mark for correct answer	1	
11	iii. import matplotlib.pyplot as plt 1 mark for correct answer	1	
12	iv. All of these 1 mark for correct answer	1	
13	VoIP	1	
14	199.3	1	
15	ii. Dismantling 1 mark for correct answer	1	
16	iii. Digital footprint 1 mark for correct answer	1	
17	ii. Both A and R are true and R is not the correct explanation for A	1	
18	i. Both A and R are true and R is the correct explanation for A	1	
SECTION B			
19	LAN	WAN	2
	Local Area Network	Wide Area Network	
	Limited to a single organization or building	Span countries and continents	
	Low cost to set up	Cost of setting up is comparatively high	

	<table border="1"> <tr> <td>Covers a distance of upto 1KM</td> <td>Distance &gt; 25 KM</td> </tr> </table> <p>1 mark each for correct difference (two differences) OR</p> <p>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)</p>	Covers a distance of upto 1KM	Distance > 25 KM							
Covers a distance of upto 1KM	Distance > 25 KM									
20	<p>a. SELECT LENGTH("Happy Holidays"); b. SELECT UPPER("Happy Holidays"); OR SELECT UCASE("Happy Holidays");</p> <p>1 mark for each correct query.</p>	2								
21	<table border="1"> <tr> <td><b>DDL</b></td> <td><b>DML</b></td> </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> <p>1 mark each for correct difference (two differences)</p>	<b>DDL</b>	<b>DML</b>	Data definition Language	Data Manipulation Language	DML commands are used to make modification of data inside the table	DML command modifies the structure of the database schema	Eg: INSERT, DELETE, UPDATE	Eg: ALTER, CREATE, DROP	2
<b>DDL</b>	<b>DML</b>									
Data definition Language	Data Manipulation Language									
DML commands are used to make modification of data inside the table	DML command modifies the structure of the database schema									
Eg: INSERT, DELETE, UPDATE	Eg: ALTER, CREATE, DROP									
22	<pre>import pandas as pd S1=pd.Series([76,88,60,85,81],index=['ENG','HINDI','MATH','SCI','SST'])</pre> <p>1 mark for each correct python statement</p>	2								
23	<p>Dismantling, segregation, refurbishment, recycling, disposal of dangerous material ½ mark for each</p> <p>Or</p> <p>i. No copyright violation ii. Share the expertise with others on the internet iii. Avoid cyber bullying iv. Respect other's privacy and diversity</p> <p>½ mark for each net etiquette</p>	2								
24	<p>0 True 1 True 2 False 3 True</p> <p>½ mark for each correct output</p>	2								
25	<p>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</p> <p>1 mark for each correct answer</p>	2								
<b>SECTION C</b>										
26	<p>a.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Coachname</td> </tr> </table>	Coachname	3							
Coachname										



	<table border="1"> <tr><td>Sardar Singh</td></tr> <tr><td>Roshan Lal</td></tr> <tr><td>Rahul Dravid</td></tr> <tr><td>Chetan Sharma</td></tr> <tr><td>Deepika Kumari</td></tr> <tr><td>Limbaram</td></tr> </table>	Sardar Singh	Roshan Lal	Rahul Dravid	Chetan Sharma	Deepika Kumari	Limbaram	
Sardar Singh								
Roshan Lal								
Rahul Dravid								
Chetan Sharma								
Deepika Kumari								
Limbaram								
	<p>b. SELECT SUM(Noofplayers) FROM SPORTS GROUP BY SportName;  c. SELECT SportName FROM SPORTS GROUP BY SportName HAVING SUM(Noofplayers) &gt; 25;</p> <p>1 mark for each correct answer</p>							
27	<pre>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'])</pre> <p>1 mark for each correct python statement</p>	3						
28	<p>i) print(DF1.Infosys)            or            print(DF1['Infosys'])  ii ) print(DF1.loc['Qtr3', :])  iii) 67</p> <p>1 mark for each correct statement</p>	3						
29	<p>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:</p> <ul style="list-style-type: none"> <li>• Be original</li> <li>• Cite/acknowledge the source</li> </ul> <p>1 mark for correct definition  1 mark for correct justification  ½ mark each for any two ways to avoid plagiarism</p>	3						
30	<p>a.</p> <p>i.        MONTHNAME(date)            - 1 mark  ii.        DATE(date)                        - 1 mark</p> <p>b.</p> <p>i. data for all                        -1/2 mark  ii. 6                                        -1/2 mark</p>	3						

	<p>OR</p> <p>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</p>	
<b>SECTION D</b>		
31	<p>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 &gt; '2004-01-01'; (1 mark for each correct query)</p> <p>OR</p> <p>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)</p>	5
32	<p>i.</p> <div style="text-align: center;">  <pre> graph TD     C[Block C] --&gt; A[Block A]     C --&gt; B[Block B]     C --&gt; D[Block D] </pre> </div> <p>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.</p> <p>iii.</p> <p>a. Block C to A, Block C to B, Block C to D – Since the distance between the blocks is greater than 80m</p>	5

	<p>b. Hub/Switch –should be placed in all the blocks, since the number of computers in each block is greater than 1</p> <p>iv. Radio waves</p> <p>v. MAN , The network formed within a city is MAN (1 mark for each correct answer)</p>	
33	<pre>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()</pre> <p>½ mark for each correct statement Python statement to save the chart:</p> <pre>plt.savefig("aa.jpg")</pre> <p>1 mark for the correct statement</p> <p style="text-align: center;">OR</p> <pre>import matplotlib.pyplot as plt Days=[1,2,3,4] wages=[40,42,38,44] plt.plot(Days,wages) plt.show()</pre> <p>1 mark for each correct statement</p>	5
<b>SECTION E</b>		
34	<p>a. SELECT MIN(MARKS), MAX(MARKS) FROM RESULT WHERE GENDER='F'; ( 1 mark)</p> <p>b. SELECT DISTINCT(CITY) FROM RESULT; ( 1 mark)</p> <p>c. SELECT AVG(MARKS) FROM RESULT GROUP BY CITY; OR SELECT SUM(MARKS) FROM RESULT GROUP BY CLASS;( 1 mark)</p>	1+1+2
35	<p>i. SPORTS['ITEM']=['Swimming', 'Dancing ', 'Cricket', 'Singing']</p> <p>ii. SPORTS.loc['SD5']=[5, 'RAM', 'M'] 1 mark for each</p> <p>iii. del SPORTS['GENDER'] OR SPORTS.drop(index= 'SD3')</p> <p>2 marks for correct Python statement</p>	1+1+2

# KENDRIYA VIDYALAYA SANGATHAN ERNAKULAM REGION

## INFORMATICS PRACTICES (065)

### SAMPLE PAPER 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	<b>Which of these is not a communication channel?</b> 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	<p>If column “City” contains the data set (CHENNAI, MUMBAI, KOLKATA, CHENNAI, KOLKATA), what will be the output after the execution of the given query?</p> <p>SELECT COUNT(DISTINCT City) FROM Customer;</p> <p>i. 4 ii. 5 iii. 3 iv. 2</p>	1
6	<p>Which of the following is not a valid chart type?</p> <p>a. lineplot b. bargraph c. histogram d. statistical</p>	1
7	<p>Which of the following crime(s) is/are covered under cybercrime?</p> <p>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.</p> <p><b>(a) only (ii) (b) (ii) and (iv) (c) (ii) and (iii) (d) (iii) and (iv)</b></p>	1
8	<p>The _____ attribute of a dataframe object returns the row labels of a dataframe.</p> <p>a. index b. columns c. rows d. column</p>	1
9	<p>Which of the following is not a network device :</p> <p>a. Repeater b. hub c. TCP d. switch</p>	1
10	<p>Website stores the browsing activity through _____</p> <p>a. web page b. Cookies c. passwords d. server</p>	1
11	<p>Which of the following is not an aggregate function ?</p> <p>a. Avg() b. Trim() c. Min() d. Sum()</p>	1
12	<p>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.</p> <p>(a) Trademark (b) Patent</p>	1

	(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	<b>ASSERTION(A):</b> The practice of taking someone else's work or ideas and passing them off as one's own <b>REASONING( R ):</b> Using graphs, charts, figures, or images without reference of source	1
18	<b>ASSERTION(A):</b> The shape attribute returns the number of rows and number of columns available in data frame. <b>REASONING( R ):</b> 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	<p>With SQL, how can you return the number of rows not null value in the Project field of Students table</p> <p>(a) SELECT COUNT(Project) FROM STUDENTS;  (b) SELECT COLUMNS(Project) FROM STUDENTS;  (c) SELECT COLUMNS(*) FROM STUDENTS;  (d) SELECT COUNT(*) FROM STUDENTS:</p> <p>Write a short explanation of your answer query.</p>	2																																																	
21	<p>What is the difference between the group by and order by clause when used along with the select statement? Explain with an example.</p>	2																																																	
22	<p>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.</p> <p>Assume that student is studying class X and have 75,78,82,82,86 marks</p>	2																																																	
23	<p>Give any 2 solutions to manage the E-Waste in the country.  OR  List any two health hazards related to excessive use of technology</p>	2																																																	
24	<p>What will be the output of the following code:</p> <pre>&gt;&gt;&gt;import pandas as pd &gt;&gt;&gt;rollno=[1,2,3,4,5,6] &gt;&gt;&gt;marks=[23,86,74,11,98,75] &gt;&gt;&gt;s=pd.Series(marks,index =rollno) &gt;&gt;&gt;print(s[s&gt;75])</pre>	2																																																	
25	<p>Carefully observe the following code:</p> <pre>import pandas as pd data = [{'a': 10, 'b': 20},{'a': 6, 'b': 32, 'c': 22}] df1 = pd.DataFrame(data) print(df1)</pre> <p><b>Answer the following:</b></p> <p>i. List the index of the DataFrame df1  ii. List the column names of DataFrame df1.</p>	2																																																	
Section C																																																			
26	<p>Ms Malini is working in a school and stores the details of all students in a table SCHOOLDATA.</p> <p>TABLE : SCHOOLDATA</p> <table border="1"> <thead> <tr> <th>Admno</th> <th>Name</th> <th>Class</th> <th>House</th> <th>Percent</th> <th>Gender</th> <th>Dob</th> </tr> </thead> <tbody> <tr> <td>20150001</td> <td>Aditya Das</td> <td>10</td> <td>Green</td> <td>86</td> <td>Male</td> <td>2006-02-20</td> </tr> <tr> <td>20140212</td> <td>Harsh Sharma</td> <td>11</td> <td>Red</td> <td>75</td> <td>Male</td> <td>2004-10-05</td> </tr> <tr> <td>20090234</td> <td>Swapnil Pant</td> <td>10</td> <td>Yellow</td> <td>84</td> <td>Female</td> <td>2005-11-21</td> </tr> <tr> <td>20130216</td> <td>Soumen Rao</td> <td>9</td> <td>Red</td> <td>91</td> <td>Male</td> <td>2006-04-10</td> </tr> <tr> <td>20190227</td> <td>Rahil Arora</td> <td>10</td> <td>Blue</td> <td>70</td> <td>Male</td> <td>2005-05-14</td> </tr> <tr> <td>20120200</td> <td>Akasha Singh</td> <td>11</td> <td>Red</td> <td>64</td> <td>Female</td> <td>2004-12-16</td> </tr> </tbody> </table> <p>Find the ouput :</p>	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
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	<p>i. SELECT LENGTH(NAME) FROM SCHOOLDATA WHERE HOUSE='Red';</p> <p>ii. SELECT LEFT (Gender, 1), Name FROM SCHOOLDATA WHERE YEAR (Dob) = 2005;</p> <p>iii. SELECT MID(UPPER(NAME),5,4) FROM SCHOOLDATA WHERE GENDER = 'Male';</p>																																																									
27	<p>Write a Python code to create a DataFrame with appropriate column headings from the list given below:</p> <pre>[[ 'Nidhi', 'Business Studies', 95 ], [ 'Gurjeet', 'Informatics Practices', 97 ], [ 'Pahul', 'Accountancy', 88 ], [ 'Divya', 'English', 72 ]]</pre>	3																																																								
28	<p>Consider the given DataFrame shop</p> <table border="1"> <thead> <tr> <th></th> <th>APPLIANCE_NAME</th> <th>DISCOUNT</th> <th>PRICE</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>REFRIGERATOR</td> <td>15</td> <td>19800</td> </tr> <tr> <td>1</td> <td>SMART PHONE</td> <td>20</td> <td>22300</td> </tr> <tr> <td>2</td> <td>TELEVISION</td> <td>22</td> <td>12900</td> </tr> <tr> <td>3</td> <td>AIR CONDITIONER</td> <td>15</td> <td>23500</td> </tr> <tr> <td>4</td> <td>WASHING MACHINE</td> <td>18</td> <td>18900</td> </tr> <tr> <td>5</td> <td>WASHING MACHINE</td> <td>15</td> <td>20110</td> </tr> </tbody> </table> <p>Write the commands for the following:</p> <p>i. Add a column called Special_Quantity with the following data: [62,26,12,32,48,52,35].</p> <p>ii. Add a new Electronics item named 'TELEVISION', 12 having price 35600.</p> <p>iii. Remove the column Special_Quantity.</p>		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	3																												
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29	<p>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.</p> <p>i. What is this happening to Sutapa?</p> <p>ii. What immediate action should she take to handle it?</p> <p>iii. Is there any law in India to handle such issues? Discuss briefly.</p> <p>OR</p> <p>What do you understand by hacking? Why is it a punishable offence? Mention any two ways to avoid hacking.</p>	3																																																								
30	<p>Based on table SCHOOL given here, write suitable SQL queries for the following:</p> <table border="1"> <thead> <tr> <th>CODE</th> <th>TEACHERNAME</th> <th>SUBJECT</th> <th>Category</th> <th>DOJ</th> <th>PDS</th> <th>EXP</th> </tr> </thead> <tbody> <tr> <td>1001</td> <td>RAVI SHANKAR</td> <td>ENGLISH</td> <td>PGT</td> <td>12/03/2000</td> <td>24</td> <td>10</td> </tr> <tr> <td>1009</td> <td>PRIYA RAI</td> <td>PHYSICS</td> <td>TGT</td> <td>03/09/1998</td> <td>26</td> <td>12</td> </tr> <tr> <td>1203</td> <td>LISA ANAND</td> <td>ENGLISH</td> <td>TGT</td> <td>09/04/2000</td> <td>27</td> <td>5</td> </tr> <tr> <td>1045</td> <td>YASHRAJ</td> <td>MATHS</td> <td>PGT</td> <td>24/08/2000</td> <td>24</td> <td>15</td> </tr> <tr> <td>1123</td> <td>GANAN</td> <td>PHYSICS</td> <td>TGT</td> <td>16/07/1999</td> <td>28</td> <td>3</td> </tr> <tr> <td>1167</td> <td>HARISH B</td> <td>CHEMISTRY</td> <td>PGT</td> <td>19/10/1999</td> <td>27</td> <td>5</td> </tr> <tr> <td>1215</td> <td>UMESH</td> <td>PHYSICS</td> <td>TGT</td> <td>11/05/1998</td> <td>22</td> <td>16</td> </tr> </tbody> </table> <p>i. Display subject wise highest experience.</p> <p>ii. Display category wise lowest experience.</p>	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	3
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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

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

31

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

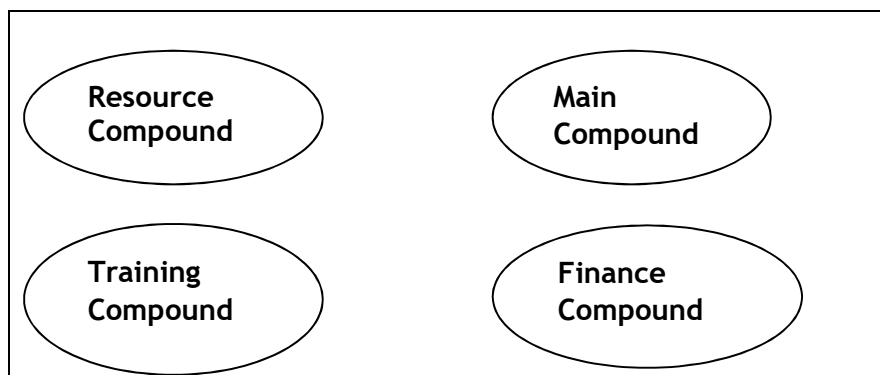
5

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

"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:

32



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

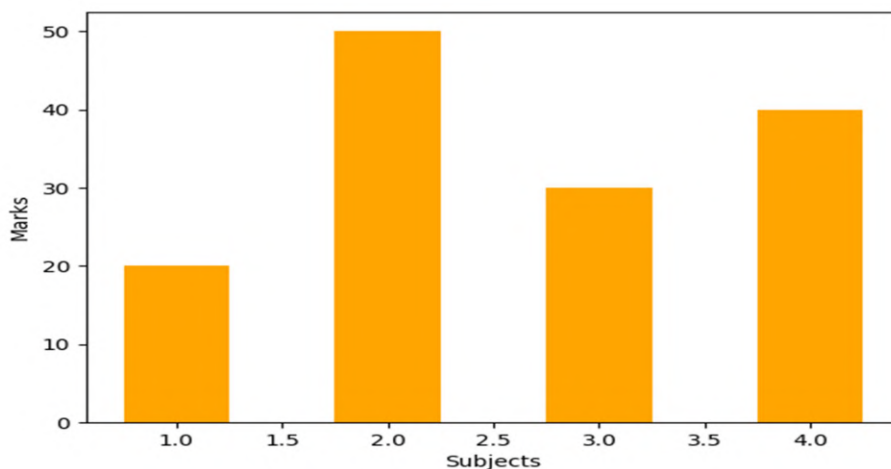
Resource Compound to Training Compound	25 m
Resource Compound to Finance Compound	135 m
Training Compound to Finance Compound	100 m

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

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



33

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 the changing medal tally between four Houses in school.

```
House=['Varun', 'Prithvi', 'Agni', 'Trishul']
medal=[50,70,90,110]
```

SECTION E

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:

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

34

1+1+2

- Write a query to display Game in lower case.
- Write a query to display the lowest class of the sports club.
- 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

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:

	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

35

1+1+2

A. Predict the output of the following python statement:

- df.shape
- 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.	<b>(c) (ii) and (iii)</b>	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
<b>Section-B</b>		
19.	<p>The Information Technology Act of 2000 came into force on October 17, 2000. This act is imposed upon the whole of India. Its provisions apply to any offense committed inside or outside India's geographic boundaries and irrespective of nationality.</p> <p>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.</p> <p style="text-align: center;"><b>Or</b></p> <p>Always use strong passwords at least eight characters long that have numbers and</p>	2

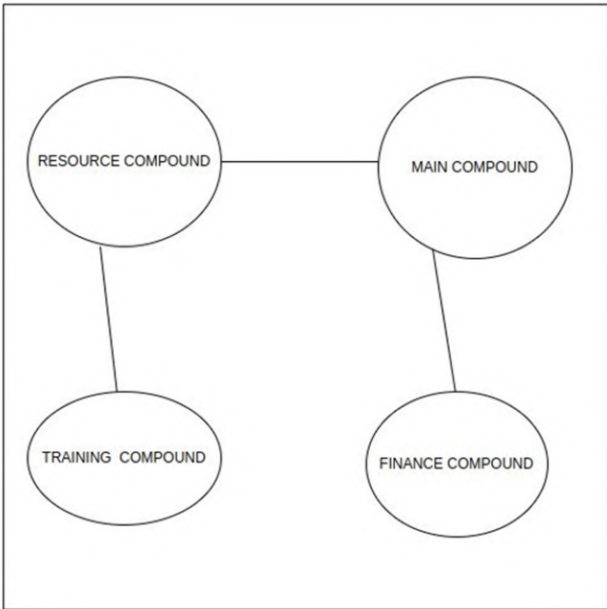
	<p>special characters (like: \$, %, &amp;), and that do not contain a word found in the dictionary. Change your passwords frequently and never share them.</p> <p>Avoid using software downloaded from unknown websites or peer-to-peer file sharing services. Avoid software that claims to be game, a screensaver, collect information for "marketing purposes" or promises to "accelerate your internet connections." These are actually programs that can include spyware.</p>									
20.	a. SELECT COUNT(Project) FROM STUDENTS; count ignores null values while counting the values in its argument column	2								
21.	<table border="1"> <thead> <tr> <th>Group By</th> <th>Order By</th> </tr> </thead> <tbody> <tr> <td>It is used to divide the table into logical groups</td> <td>It sorts the result set either in ascending or descending order</td> </tr> <tr> <td>Logical grouping is done based on the similarity among the row's attribute values.</td> <td>result-set is sorted based on the column's attribute values, either ascending or descending order.</td> </tr> <tr> <td>Select brand, count(*) from appliances group by Brand</td> <td>Select * from appliances order by discount asc;</td> </tr> </tbody> </table>	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
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Select brand, count(*) from appliances group by Brand	Select * from appliances order by discount asc;									
22.	<pre>In [6]: subject = pandas.Series([75,78,82,86], index= ['Hindi', 'English', 'Maths', 'Science'])</pre> <pre>In [7]: subject</pre> <pre>Out[7]: Hindi      75 English      78 Maths        82 Science      86 dtype: int64</pre>	2								
23.	<p>i. Give Your Electronic Waste to a Certified E-Waste Recycler</p> <p>ii. Donating Your Outdated Technology</p> <p>iii. Give Back to Your Electronic Companies and Drop Off Point</p> <p><b>Or</b></p> <p>The continuous use of devices like smartphones, computer desktop, laptops, head phones etc cause a lot of health hazards if not addressed. These are:</p> <p>i. Impact on bones and joints: wrong posture or long hours of sitting in an uncomfortable position can cause muscle or bone injury</p> <p>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.</p> <p>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.</p> <p>iv. Sleep problem: Bright light from computer devices block a hormone called melatonin which helps us sleep. Thus, we can experience sleep disorders</p>	2								

	leading to short sleep cycles													
	<b>Write any Two</b>													
24.	2 86 5 98 dtype: int64	2												
25.	<table border="1"> <thead> <tr> <th></th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>10</td> <td>20</td> <td>NaN</td> </tr> <tr> <td>1</td> <td>6</td> <td>32</td> <td>22.0</td> </tr> </tbody> </table> <p>i. 0 1</p> <p>ii. a b c</p>		a	b	c	0	10	20	NaN	1	6	32	22.0	2
	a	b	c											
0	10	20	NaN											
1	6	32	22.0											
	<b>Section - C</b>													
26.	<p>i) LENGTH(NAME) 12 10 12</p> <p>ii) LEFT (Gender, 1)      Name F                              Swapnil Pant M                              Rahil Arora</p> <p>iii) MID(UPPER(NAME),5,4) A DA SHA N RA A SI</p>	3												
27.	<pre>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)</pre>	3												
28	<p>i. stock['Special_quantity']=[ 62,26,12,32,48,52,35]]</p> <p>ii. stock.loc['6']=[ 'TELEVISION',12, 35600]</p> <p>iii. stock=stock.drop('Special_quantity',axis=1)</p>	3												
29	<p><b>Hacking is the act of compromising digital devices and networks through unauthorized access to an account or computer system.</b></p> <p>Hacking is not always a malicious act, but it is most commonly associated with illegal activity and data theft by cyber criminals.</p> <p>Ways to avoid Hacking:</p> <p>Use two-factor authentication.</p>	3												

	Make sure you're on an official website when entering passwords.															
<b>30</b>	<p>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;</p> <p>1 mark for each correct query</p> <p>OR</p> <table border="1"> <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> <p>Consider the table SPORTS</p> <table> <tr> <td><b>S_Id</b></td> <td><b>Name</b></td> </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> <p>Select count(*) from sports;  Output : 4</p> <p>Select count(Name) from sports;  Output : 3</p> <p>Here the second output is 3 because Name column contain a NULL value</p> <p><b>1 mark for correct significance</b>  <b>2 marks for correct example</b></p>	Count(*)	Count( )	Is used to count the number of rows in query	Is used to count the values present in any column excluding NULL values	<b>S_Id</b>	<b>Name</b>	SW01	NULL	SB02	Football	SB03	Hockey	SW04	Swimming	<b>3</b>
Count(*)	Count( )															
Is used to count the number of rows in query	Is used to count the values present in any column excluding NULL values															
<b>S_Id</b>	<b>Name</b>															
SW01	NULL															
SB02	Football															
SB03	Hockey															
SW04	Swimming															

**SECTION D**

<b>31</b>	<p>i. select CURDATE();  ii. select UCASE('Kendriya')  iii. select rtrim( "Good Morning ");  iv. select month(curdate());  v. select power(n1,n2);</p> <p align="center"><b>OR</b></p> <p>i. select stationaryname, ROUND(price) from stationary;  ii. select INSTR(stationaryname, 'en') from stationary;  iii. select LEFT(stationaryname, 4) from stationary;</p>	<b>5</b>
-----------	--	----------

	iv. select LCASE(company ) from stationary; select LEN(stationaryname) from stationary;	
32	 <p>e1. e2. Bus topology e3. Training compound. e4. i. Repeater to be connected between Resource compound and Main compound as the distance is more than 70m. ii. Hub/Switch to be connected in every compound to network computers. e5. ii. Optical Fiber</p>	5
33	<pre>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")</pre> <p style="text-align: center;"><b>or</b></p> <pre>import matplotlib.pyplot as plt house=['Varun', 'Prithvi', 'Agni', 'Trishul'] medal=[50,70,90,110] plt.plot(house,medal) plt.show()</pre>	5
<b>SECTION E</b>		
34	<p>i. Select lower(Game) from sports; ii. Select min(Class) from sports ; <b>1 mark for each correct query</b></p> <p>iii. Select count(class) from sports group by game having grade='A' OR Select Class ,count(Game) from sports group by Game; <b>2 marks for correct query</b></p>	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

**KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION**  
**INFORMATICS PRACTICES (065)**  
**SAMPLE QUESTION PAPER**  
**Class XII**

Max Marks: 70

Time: 3 hrs

<b>General Instructions:</b>		
<ol style="list-style-type: none"> <li>1. This question paper contains five sections, Section A to E.</li> <li>2. All questions are compulsory.</li> <li>3. Section A have 18 questions carrying 01 mark each.</li> <li>4. Section B has 07 Very Short Answer type questions carrying 02 marks each.</li> <li>5. Section C has 05 Short Answer type questions carrying 03 marks each.</li> <li>6. Section D has 03 Long Answer type questions carrying 05 marks each.</li> <li>7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part C only.</li> <li>8. All programming questions are to be answered using Python Language only.</li> </ol>		
<b>PART A</b>		
1	Given a Pandas series called S, the command which will display the last 4 rows is _____. <ol style="list-style-type: none"> <li>a. print(S.tail(4))</li> <li>b. print(s.Tail())</li> <li>c. print(s.tails(4))</li> <li>d. print(s.tail(4))</li> </ol>	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. <ol style="list-style-type: none"> <li>a. text</li> <li>b. cookies</li> <li>c. email</li> <li>d. chat</li> </ol>	1
3	The trim()function in MySql is an example of _____. <ol style="list-style-type: none"> <li>a. Math function</li> <li>b. Text function</li> <li>c. Date Function</li> <li>d. Aggregate Function</li> </ol>	1
4	The___command can be used to insert a new row in a table in SQL. <ol style="list-style-type: none"> <li>a. add()</li> <li>b. append</li> <li>c. insert into</li> <li>d. alter table.</li> </ol>	1
5	State whether True or False : <ol style="list-style-type: none"> <li>i. Copying and pasting data from internet or other digital resources is ethical.</li> <li>ii. E-waste is very hazardous if not handled carefully.</li> </ol>	1
6	Rohan wants to print the row labels of the dataframe. He should use the _____ attribute of a dataframe. <ol style="list-style-type: none"> <li>a. column</li> <li>b. columns</li> <li>c. index</li> <li>d. rowname</li> </ol>	1

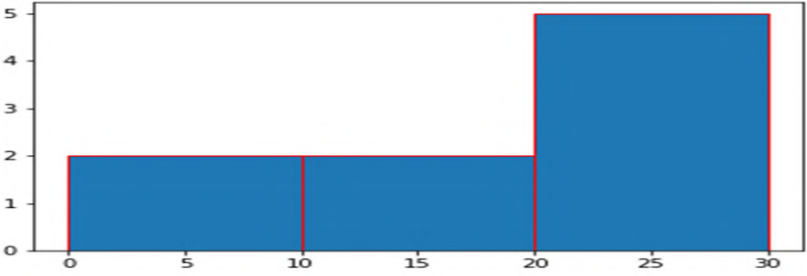
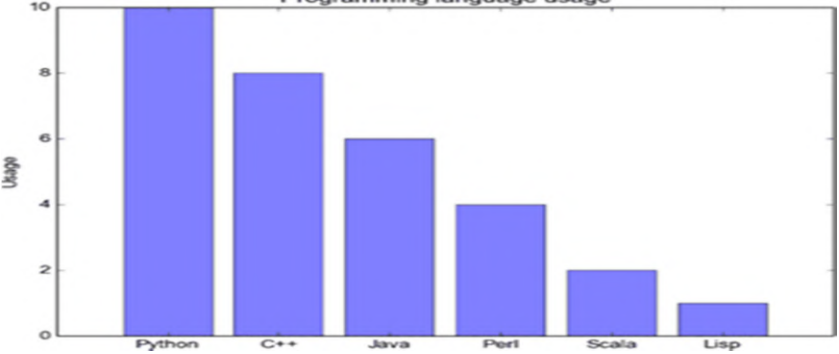
7	Write the output of the following SQL command. select pow(2,-2); a. -4 b. 4 c. 0.25 d. -0.25	1
8	<b>What is e-waste?</b> (a) electronic waste (b) environmental waste (c) earth waste (d) energy waste	1
9	What will be the output of the following code? mysql>> lcase ('INFORMATICS PRACTICES CLASS 12TH');	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 c. cyber stalking d. All of the above.	1
Q17 and 18 are <b>ASSERTION AND REASONING</b> 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	<b>Assertion (A)</b> : import matplotlib.pyplot as plt is used to import pyplot . <b>Reason (R)</b> :It is python library so it is imported for using its function.																																			
18	<b>Assertion (A)</b> :- Series store data row wise. <b>Reasoning (R)</b> : - A Series is a one-dimensional labelled data structure.																																			
<b>SECTION B</b>																																				
19	Consider a given Series , T1: SUB1 45 SUB2 65 SUB3 24 SUB4 89 Write a program in Python Pandas to create the series. <b>OR</b> Define Series. Write a python statement to create an empty statement.	2																																		
20	Rohit writes the following commands with respect to a table student having fields, Sno, name, Age, fee. 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.	2																																		
21	Consider the following Series object, C_amt 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.	2																																		
22	Consider the following DataFrame, Student <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Rollno</th> <th>Name</th> <th>Class</th> <th>Section</th> <th>Marks</th> <th>Stream</th> </tr> </thead> <tbody> <tr> <td>S1</td> <td>1</td> <td>Sheetal</td> <td>XI</td> <td>A</td> <td>87</td> <td>Science</td> </tr> <tr> <td>S2</td> <td>2</td> <td>Preet</td> <td>XI</td> <td>B</td> <td>89</td> <td>Arts</td> </tr> <tr> <td>S3</td> <td>3</td> <td>Kartik</td> <td>XI</td> <td>A</td> <td>92</td> <td>Science</td> </tr> <tr> <td>S4</td> <td>4</td> <td>Laksh</td> <td>XI</td> <td>A</td> <td>94</td> <td>Commerce</td> </tr> </tbody> </table> 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)	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	2
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23	Expand the following terms related to Computer Networks: a. HTTP b. POP3	2																																		

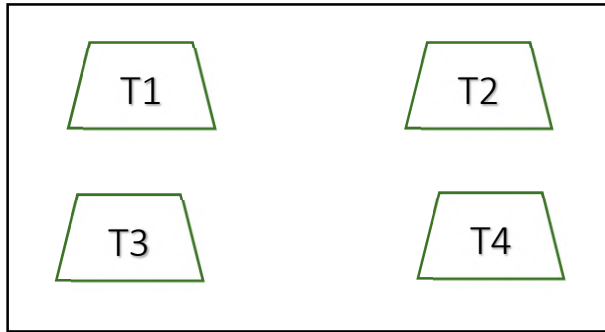


30	<p>Predict the output of the following queries:</p> <p>I) SELECT INSTR ('Very good', 'good');</p> <p>II) SELECT MID('Quadratically',5,6);</p> <p>III) SELECT RIGHT ('Command', 3);</p> <p style="text-align: center;"><b>OR</b></p> <p>Explain the following SQL functions using suitable examples.</p> <p>a) INSTR()</p> <p>b) MID()</p> <p>c) RIGHT()</p>	3
----	---	---

**SECTION D**

31	<p>Consider the following graph. Write the code to plot it.</p>  <p style="text-align: center;"><b>OR</b></p> <p>Draw the following bar graph representing the uses of programming language.</p> 	5
----	--	---

32	<p>A company AST Enterprises has 4 wings of buildings as shown in the diagram :</p> <p>Center to center distances between various Buildings:</p> <p>T3 to T1 - 50m</p> <p>T1 to T2 - 60m</p> <p>T2 to T4 - 25m</p> <p>T4 to T3 - 170m</p> <p>T3 to T2 - 125m</p> <p>T1 to T4 - 90m</p> <p>Number of computers in each of the wing:</p> <p>T1 - 140</p> <p>T2 - 15</p> <p>T3 - 15</p> <p>T4 - 25</p>	5
----	---	---



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
O101	2015-09-12	Ravi Kumar	34000
O102	2015-08-15	Rashmi Arora	50000
O103	2015-11-01	Ravi Kumar	55000
O104	2015-12-09	Manjeet Singh	60000
O105	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:

- Count the type of vehicles manufactured by each company.
- Display the total price of all the types of vehicles.
- 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

- Write python code to create the dataframe.

Perform the following operations on the DataFrame :

- Add both the male and female passengers and assign to column "Total\_ passengers"
- 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']
```

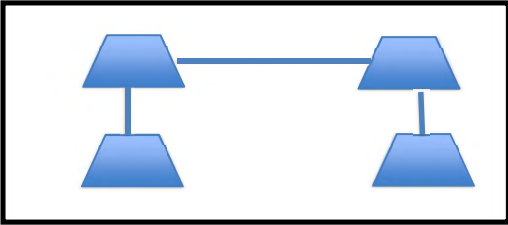


**SET-III****KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION****INFORMATICS PRACTICES (065) SAMPLE QUESTION PAPER****Class XII - Marking Scheme****Max. Marks: 70****Time: 3 hours**

<b>QNo..</b>	<b>Section A</b>	<b>Total</b>
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	<b>i. False</b> <b>ii. True</b> <b>½ mark for each correct answer</b>	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
18	iv. A is false but R is True	1

<b>Section B</b>										
19	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	2								
20	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.	2								
21	<b>i. print(C_amt [C_amt &lt;100])</b> <b>ii. C_amt.name=' comp_items '</b> 1 mark each for correct answer of part (i) , (ii)	2								
22	i. classframe['Percentage']=[87,89,92,94] ii. classframe.loc['t5']=[5,'ROHIT', 'XI', 'A', 98, 'Science'] 1 mark for each correct answer	2								
23	<b>a. HTTP: Hyper Text Transfer Protocol</b> <b>b. POP: Point to Point Protocol</b> <b>c. FTP: File Transfer Protocol</b> <b>d. VoIP: Voice over Internet Protocol</b> ½ marks for each correct full form  Or <b><u>Difference between Static and Dynamic webpage</u></b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding: 5px;">Static <u>webpage</u> content is constant in all time</td> <td style="padding: 5px;">The page content changes according to the user.</td> </tr> <tr> <td style="padding: 5px;">Loading time is less</td> <td style="padding: 5px;">Loading time is more</td> </tr> <tr> <td style="padding: 5px;">No database is used</td> <td style="padding: 5px;">A database is used in the server side</td> </tr> <tr> <td style="padding: 5px;">Content changes rarely</td> <td style="padding: 5px;">Content changes constantly</td> </tr> </tbody> </table>	Static <u>webpage</u> content is constant in all time	The page content changes according to 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	2
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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									
24	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))	2								
25	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. ii. Impact on hearing: using headphones or earphones for a prolonged time	2								

	<p>and on high volume can cause hearing problems and in severe cases hearing impairments.</p> <p>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.</p> <p>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.</p> <p>2 marks for any two correct points</p>									
	<b>SECTION C</b>									
26	<p>a. will give the output as: [20,40,90,110,20,40,90,110]</p> <p>b. will give the output as</p> <table style="margin-left: 20px;"> <tr><td>0</td><td>40</td></tr> <tr><td>1</td><td>80</td></tr> <tr><td>2</td><td>180</td></tr> <tr><td>3</td><td>220</td></tr> </table> <p>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.</p> <p>1 mark for output of list multiplication 1 mark for output of Series multiplication 1 mark for the justification</p>	0	40	1	80	2	180	3	220	3
0	40									
1	80									
2	180									
3	220									
27	<p>a. SELECT COUNT(Item) FROM Infant WHERE Discount &gt; 10; b. SELECT MAX(UnitPrice) FROM Infant; c. SELECT Item FROM Infant WHERE Item LIKE '%Baby%';</p> <p>1 mark for each correct query</p>	3								
28	<pre>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'])</pre> <p>1 mark for each correct python statement</p>	3								
29	<p>Diff. methods of user identification are:</p> <ol style="list-style-type: none"> <li>a. Password</li> <li>b. Token</li> <li>c. Biometrics</li> <li>d. OTP</li> </ol> <p style="text-align: center;">OR</p> <p>Following measures can be adopted to recycle the e-waste safely. Use a certified e-waste recycler.</p> <ol style="list-style-type: none"> <li>b. Visit civic institutions.</li> <li>c. Explore retail options.</li> <li>d. Donate your electronics.</li> </ol>	3								

	3 marks for correct measures and its explanation.	
30	IV) 6 V) Ratica VI) and <b>OR</b> 1 mark for each correct explanation of functions.	3
<b>Section D</b>		
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() <b>1 mark for the import statement</b> <b>1 mark for appropriate usage of hist() 1 mark for show()</b> <b>OR</b> 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() <b>1 mark for the import statement</b> <b>1 mark for appropriate usage of bar()</b> <b>1 mark for show().</b>	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 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)	5

	<p>b. In every wing</p> <p>½ mark for placement of repeater ½ mark for placement of hub / switch</p> <p>v) Radio Waves</p> <p>1 mark for the appropriate connectivity mode between HQ and other offices</p>	
33	<p>(i) SELECT SYSDATE();</p> <p>(ii) SELECT MID('LearningIsFun',2,4);</p> <p>(iii) SELECT ROUND(76.384,2);</p> <p>(iv) SELECT INSTR('INFORMATION FORM','RM');</p> <p>(v) SELECT POW(9,3);</p> <p>1 mark for each correct answer</p> <p style="text-align: center;"><b>OR</b></p> <p>(i) SELECT COUNT (*) FROM Order WHERE SalesPerson LIKE "R%";</p> <p>(ii) Select instr(Salesperson, "an") from order;</p> <p>(iii) Select mid(Salesperson,2,4) from order;</p> <p>(iv) Select avg(OrderAmount) from order.</p> <p>(v) Select dayname(OrderDate) from order;</p> <p>1 mark for each correct answer</p>	5
<b>SECTION E</b>		
34	<p>a) select Company, count(distinct Type) from Vehicle group by Company;</p> <p>b) Select Type, sum(Price* Qty) from Vehicle group by Type;</p> <p>c) select Type, avg(Price) from Vehicle group by Type having Qty&gt;20;</p> <p style="text-align: center;"><b>OR (Option for part iii only)</b></p> <p>Select type,price*quantity as 'TOTAL PRICE' from vehicles group by company.</p>	1+1+2
35	<p>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)</p> <p>2) df['Total_passengers']=df['MalePassengers']+ df['FemalePassengers'] print(df)</p> <p>3) print("Maximum Passengers are : ", max(df['MalePassengers']), max(df['FemalePassengers']))</p> <p>1 mark for import statement 2 marks for creating the dataframe</p>	1+1+2

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
---	------	-------	-----

**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.

<b>PART A</b>		
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?  <b>SELECT COUNT(column name) FROM inventory;</b>  i. Numeric value ii. text value iii. Null value iv. Date value	1

5.	<p>If column “Fees” contains the data set (5000,8000,7500,5000,8000), what will be the output after the execution of the given query?  <b>SELECT SUM (DISTINCT Fees) FROM student;</b></p> <p>i. 20500  ii. 10000  iii. 20000  iv. 33500</p>	1
6.	<p>‘O’ in FOSS stands for:</p> <p>i. Outsource  ii. Open  iii. Original  iv. Outstanding</p>	1
7.	<p>Which SQL statement do we use to find out the total number of records present in the table ORDERS?</p> <p>i. SELECT * FROM ORDERS;  ii. SELECT COUNT (*) FROM ORDERS;  iii. SELECT FIND (*) FROM ORDERS;  iv. SELECT SUM () FROM ORDERS;</p>	1
8.	<p>Which one of the following is not an aggregate function?</p> <p>i. ROUND()  ii. SUM()  iii. COUNT()  iv. AVG()</p>	1
9.	<p>Which one of the following functions is used to find the largest value from the given data in MySQL?</p> <p>i. MAX()  ii. MAXIMUM()  iii. BIG()  iv. LARGE()</p>	1
10.	<p>To display last five rows of a series object ‘S’, you may write:</p> <p>i. S.Head()  ii. S.Tail(5)  iii. S.Head(5)  iv. S.tail()</p>	1
11.	<p>Which of the following statement will import pandas library?</p> <p>i. Import pandas as pd  ii. import Pandas as py  iii. import pandas as pd  iv. import panda as pd</p>	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.	<b>Assertion (A):</b> - Internet cookies are text files that contain small pieces of data, like a username, password and user's preferences while surfing the internet. <b>Reasoning (R):-</b> To make browsing the Internet faster & easier, its required to store certain information on the server's computer.	1
18.	<b>Assertion (A):-</b> DataFrame has both a row and column index. <b>Reasoning (R):</b> - A DataFrame is a two-dimensional labelled data structure like a table of MySQL.	1

<b>PART B</b>		
19.	<p>Explain the terms Web page and Home Page.</p> <p>OR</p> <p>Mention any four networking goals.</p>	2
20.	<p>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:</p> <pre>SELECT HOUSE, COUNT (*) FROM STUDENT GROUP BY HOUSE WHERE HOUSE='RED' OR HOUSE= 'YELLOW';</pre> <p>Help her in identifying the reason of the error and write the correct query by suggesting the possible correction (s).</p>	2
21.	<p>What is the purpose of Order By clause in SQL? Explain with the help of suitable example.</p>	2
22.	<p>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.</p> <p>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.</p>	2
23.	<p>List any four benefits of e-waste management.</p> <p>OR</p> <p>Mention any four net etiquettes.</p>	2
24.	<p>What will be the output of the following code:</p> <pre>&gt;&gt;&gt;import pandas as pd &gt;&gt;&gt;A=pd.Series(data=[35,45,55,40]) &gt;&gt;&gt;print(A&gt;45)</pre>	2
25.	<p>Carefully observe the following code:</p> <pre>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)</pre> <p>Answer the following:</p> <ol style="list-style-type: none"> <li>i. List the index of the DataFrame df</li> <li>ii. List the column names of DataFrame df.</li> </ol>	2

<b>SECTION C</b>
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26.	<p>Write outputs for SQL queries (i) to (iii) which are based on the given table PURCHASE:</p> <p style="text-align: center;"><b>TABLE: PURCHASE</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>CNO</th> <th>CNAME</th> <th>CITY</th> <th>QUANTITY</th> <th>DOP</th> </tr> </thead> <tbody> <tr> <td>C01</td> <td>GURPREET</td> <td>NEW DELHI</td> <td>150</td> <td>2022-06-11</td> </tr> <tr> <td>C02</td> <td>MALIKA</td> <td>HYDERABAD</td> <td>10</td> <td>2022-02-19</td> </tr> <tr> <td>C03</td> <td>NADAR</td> <td>DALHOUSIE</td> <td>100</td> <td>2021-12-04</td> </tr> <tr> <td>C04</td> <td>SAHIB</td> <td>CHANDIGARH</td> <td>50</td> <td>2021-10-10</td> </tr> <tr> <td>C05</td> <td>MEHAK</td> <td>CHANDIGARH</td> <td>15</td> <td>2021-10-20</td> </tr> </tbody> </table> <p>i. <b>SELECT LENGTH(CNAME) FROM PURCHASE WHERE QUANTITY&gt;100;</b></p> <p>ii. <b>SELECT CNAME FROM PURCHASE WHERE MONTH(DOP)=3;</b></p> <p>iii. <b>SELECT MOD (QUANTITY, DAY(DOP)) FROM PURCHASE WHERE CITY= 'CHANDIGARH';</b></p>	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	3
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C05	MEHAK	CHANDIGARH	15	2021-10-20																												
27.	<p>Write a Python code to create a DataFrame with appropriate column headings from the list given below:</p> <p><b>[[101,'Gurman',98],[102,'Rajveer',95],[103,'Samar' ,96], [104,'Yuvraj',88]]</b></p>	3																														
28.	<p>Consider the given DataFrame 'Stock':</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Name</th> <th>Price</th> </tr> </thead> <tbody> <tr> <td><b>0</b></td> <td><b>Nancy Drew</b></td> <td><b>150</b></td> </tr> <tr> <td><b>1</b></td> <td><b>Hardy boys</b></td> <td><b>180</b></td> </tr> <tr> <td><b>2</b></td> <td><b>Diary of a wimpy kid</b></td> <td><b>225</b></td> </tr> <tr> <td><b>3</b></td> <td><b>Harry Potter</b></td> <td><b>500</b></td> </tr> </tbody> </table> <p>Write suitable Python statements for the following:</p> <p>i. Add a column called Special_Price with the following data: [135,150,200,440].</p> <p>ii. Add a new book named 'The Secret' having price 800.</p> <p>iii. Remove the column Special_Price.</p>		Name	Price	<b>0</b>	<b>Nancy Drew</b>	<b>150</b>	<b>1</b>	<b>Hardy boys</b>	<b>180</b>	<b>2</b>	<b>Diary of a wimpy kid</b>	<b>225</b>	<b>3</b>	<b>Harry Potter</b>	<b>500</b>	3															
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29.	<p>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.</p> <p>She is also getting repeated mails from unknown people. Every time she goes online, she finds someone chasing her online.</p> <p>i. What is this happening to Nadar?</p> <p>ii. What immediate action should she take to handle it?</p> <p>iii. Is there any law in India to handle such issues? Discuss briefly.</p>	3																														

<b>OR</b>		
	What do you understand by plagiarism? Why is it a punishable offence? Mention any two ways to avoid plagiarism.	

30.	<p>Based on table <b>STUDENT</b> given here, write suitable SQL queries for the following:</p> <table border="1" data-bbox="324 252 1185 588"> <thead> <tr> <th>Roll No</th> <th>Name</th> <th>Class</th> <th>Gender</th> <th>City</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Abhishek</td> <td>XI</td> <td>M</td> <td>Agra</td> <td>430</td> </tr> <tr> <td>2</td> <td>Prateek</td> <td>XII</td> <td>M</td> <td>Mumbai</td> <td>440</td> </tr> <tr> <td>3</td> <td>Sneha</td> <td>XI</td> <td>F</td> <td>Agra</td> <td>470</td> </tr> <tr> <td>4</td> <td>Nancy</td> <td>XII</td> <td>F</td> <td>Mumbai</td> <td>492</td> </tr> <tr> <td>5</td> <td>Himnashu</td> <td>XII</td> <td>M</td> <td>Delhi</td> <td>360</td> </tr> <tr> <td>6</td> <td>Anchal</td> <td>XI</td> <td>F</td> <td>Dubai</td> <td>256</td> </tr> <tr> <td>7</td> <td>Mehar</td> <td>X</td> <td>F</td> <td>Moscow</td> <td>324</td> </tr> <tr> <td>8</td> <td>Nishant</td> <td>X</td> <td>M</td> <td>Moscow</td> <td>429</td> </tr> </tbody> </table> <p>i. Display gender wise highest marks.  ii. Display city wise lowest marks.  iii. Display total number of male and female students.</p> <p style="text-align: center;"><b>OR</b></p> <p>Discuss the significance of Group by clause in detail with the help of suitable example.</p>	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	3
Roll No	Name	Class	Gender	City	Marks																																																			
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8	Nishant	X	M	Moscow	429																																																			
<b>SECTION D</b>																																																								
31.	<p>Write suitable SQL query for the following:</p> <ol style="list-style-type: none"> <li>Display 7 characters extracted from 7<sup>th</sup> left character onwards from the string 'INDIA SHINING'.</li> <li>Display the position of occurrence of string 'COME' in the string 'WELCOME WORLD'.</li> <li>Round off the value 23.78 to one decimal place.</li> <li>Display the remainder of 100 divided by 9.</li> <li>Remove all the expected leading and trailing spaces from a column userid of the table 'USERS'.</li> </ol> <p style="text-align: center;"><b>OR</b></p> <p>Explain the following SQL functions using suitable examples.</p> <ol style="list-style-type: none"> <li>UCASE()</li> <li>TRIM()</li> <li>MID()</li> <li>DAYNAME()</li> <li>POWER()</li> </ol>	5																																																						
32.	<p>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.</p> <p>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.</p>	5																																																						

DELHI HEAD OFFICE

EXAMINATION

ADMIN

ACCOUNTS

RESULT

Shortest distances between various buildings:

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

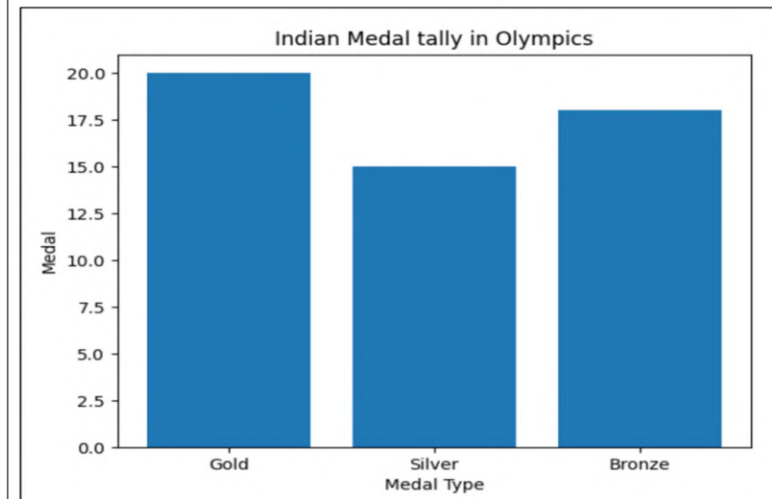
Number of computers installed at various buildings are as follows:

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

- (i) Suggest the most appropriate location of the server inside the MUMBAI campus (out of the four buildings) to get the best connectivity for maximum number of computers. Justify your answer.
- (ii) Suggest and draw cable layout to efficiently connect various buildings within the MUMBAI campus for a wired connectivity.
- (iii) Which networking device will you suggest to be procured by the company to interconnect all the computers of various buildings of MUMBAI campus?
- (iv) Company is planning to get its website designed which will allow students to see their results after registering themselves on its server. Out of the static or dynamic, which type of website will you suggest?
- (v) Which of the following will you suggest to establish the online face to face communication between the people in the ADMIN office of Mumbai campus and Delhi head office?
  - a) Cable TV
  - b) Email
  - c) Video conferencing
  - d) Text chat

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 the changing 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

1+1+2

table:TABLE: CLOTH

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

- i. Write a query to display cloth names in lower case.
- ii. Write a query to display the lowest price of the cloths.
- iii. Write a query to count total number of cloths purchased of medium size.

**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 shown below. Answer the following questions:

	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

1+1+2

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 indexes CO2 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.

**SAMPLE QUESTION PAPER**  
**MARKING SCHEME**  
**CLASS XII - INFORMATICS PRACTICES (065)**

TIME: 3 HOURS

M.M.70

1.	iii. MAN <b>1 mark for correct answer</b>	1
2.	ii. Installing antivirus for protection <b>1 mark for correct answer</b>	1
3.	iii. Unused old computers <b>1 mark for correct answer</b>	1
4.	iii. Null value <b>1 mark for correct answer</b>	1
5.	i. 20500 <b>1 mark for correct answer</b>	1
6.	ii. Open <b>1 mark for correct answer</b>	1
7.	ii. SELECT COUNT (*) FROM ORDERS; <b>1 mark for correct answer</b>	1
8.	i. ROUND() <b>1 mark for correct answer</b>	1
9.	i. MAX () <b>1 mark for correct answer</b>	1
10.	iv. S.tail() <b>1 mark for correct answer</b>	1
11.	iii. import pandas as pd <b>1 mark for correct answer</b>	1
12.	iv. All of these	1

	<b>1 mark for correct answer</b>	
13.	iii. Avast <b>1 mark for correct answer</b>	1
14.	iv. Now() <b>1 mark for correct answer</b>	1
15.	i. Copyright <b>1 mark for correct answer</b>	1
16.	iii. Digital footprint <b>1 mark for correct answer</b>	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.	<b>Web Page:</b> A Web Page is a part of a website and is commonly written in HTML. It can be accessed through a web browser. <b>Home Page:</b> It is the first web page you see when you visit a website. <b>1 mark for correct explanation of each term</b> <b>Or</b> <b>Four networking goals are:</b> i. Resource sharing ii. Reliability iii. Cost effective iv. Fast data sharing <b>½ mark for each goal</b>	2



20.	<p>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 HAVINGHOUSE= 'RED' OR HOUSE='YELLOW';</p> <p><b>1 Mark for error identification</b> <b>1 Mark for writing correct query</b></p>	2
21.	<p>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;</p> <p><b>1 mark for correct purpose</b> <b>1 mark for correct example</b></p>	2
22.	<p>St={'Beas' :18, 'Chenab' :20 , ' Ravi' :20, ' Satluj' :18} S1=pd.Series(St)</p> <p><b>1 mark for each correct python statement</b></p>	2
23.	<p><b>The e-waste management-</b></p> <ul style="list-style-type: none"> <li><b>i. Saves the environment and natural resources</b></li> <li><b>ii. Allows for recovery of precious metals</b></li> <li><b>iii. Protects public health and water quality</b></li> <li><b>iv. Saves landfill space</b></li> </ul> <p><b>½ mark for each benefit</b></p> <p style="text-align: center;">Or</p> <ul style="list-style-type: none"> <li><b>i. No copyright violation</b></li> <li><b>ii. Share the expertise with others on the internet</b></li> <li><b>iii. Avoid cyber bullying</b></li> <li><b>iv. Respect other's privacy and diversity</b></li> </ul> <p><b>½ mark for each net etiquette</b></p>	2
24.	<p>0      False 1      False 2      True 3      False</p> <p><b>½ mark for each correct output</b></p>	2
25.	<ul style="list-style-type: none"> <li><b>i. The index labels of df will include Q1,Q2,Q3,Q4,A,B,C</b></li> <li><b>ii. The column names of df will be: 1,2</b></li> </ul> <p><b>1 mark for each correct answer</b></p>	2
26.	<ul style="list-style-type: none"> <li><b>i. 8</b></li> <li><b>ii. No Output</b></li> <li><b>iii. 0</b></li> <li><b>15</b></li> </ul> <p><b>1 mark for each correct output</b></p>	3

27.	<pre>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'])</pre> <p><b>1 mark for each correct python statement</b></p>	3
28.	<p>i. Stock['Special_Price']=[135,150,200,400]  ii. Stock.loc[4]='The Secret',800]  iii. Stock=Stock.drop('Special_Price',axis=1)</p> <p><b>1 mark for each correct statement</b></p>	3
29.	<p>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.</p> <p><b>1 mark for each correct answer</b></p> <p style="text-align: center;">OR</p> <p>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:</p> <ul style="list-style-type: none"> <li>• Be original</li> <li>• Cite/acknowledge the source</li> </ul> <p><b>1 mark for correct definition</b>  <b>1 mark for correct justification</b>  <b>½ mark each for any two ways to avoid plagiarism</b></p>	3

30.	<p>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;</p> <p><b>1 mark for each correct query</b></p> <p style="text-align: center;"><b>OR</b></p> <p>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.</p> <p><b>For example:</b></p> <p>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.</p> <p><b>Considering the following table STUDENT:</b></p> <table border="1" data-bbox="371 674 1325 1054"> <thead> <tr> <th>Roll No</th> <th>Name</th> <th>Class</th> <th>Gender</th> <th>City</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Abhishek</td> <td>XI</td> <td>M</td> <td>Agra</td> <td>430</td> </tr> <tr> <td>2</td> <td>Prateek</td> <td>XII</td> <td>M</td> <td>Mumbai</td> <td>440</td> </tr> <tr> <td>3</td> <td>Sneha</td> <td>XI</td> <td>F</td> <td>Agra</td> <td>470</td> </tr> <tr> <td>4</td> <td>Nancy</td> <td>XII</td> <td>F</td> <td>Mumbai</td> <td>492</td> </tr> <tr> <td>5</td> <td>Himnashu</td> <td>XII</td> <td>M</td> <td>Delhi</td> <td>360</td> </tr> <tr> <td>6</td> <td>Anchal</td> <td>XI</td> <td>F</td> <td>Dubai</td> <td>256</td> </tr> <tr> <td>7</td> <td>Mehar</td> <td>X</td> <td>F</td> <td>Moscow</td> <td>324</td> </tr> <tr> <td>8</td> <td>Nishant</td> <td>X</td> <td>M</td> <td>Moscow</td> <td>429</td> </tr> </tbody> </table> <p><b>SQL query for the above-mentioned task is as follows:</b> select gender,count(gender) from student group by gender;<b>Output:</b></p> <table data-bbox="354 1157 704 1251"> <thead> <tr> <th>Gender</th> <th>Count(Gender)</th> </tr> </thead> <tbody> <tr> <td>M</td> <td>4</td> </tr> <tr> <td>F</td> <td>4</td> </tr> </tbody> </table> <p><b>1 mark for correct significance 2 marks for correct example</b></p>	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	Gender	Count(Gender)	M	4	F	4	3
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31.	<p>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;</p> <p><b>1 mark for each correct query</b></p>	5																																																												

	<p style="text-align: center;"><b>OR</b></p> <p><b>1. UCASE():</b> It converts the string into upper case.  <b>Example:</b>  SELECT UCASE('welcome world');</p> <p><b>Output:</b>  WELCOME WORLD</p> <p><b>2. TRIM():</b> It removes the leading and trailing spaces from the given string.  <b>Example:</b>  SELECT TRIM(' Welcome world ');</p> <p><b>Output:</b>  Welcome world</p> <p><b>3. MID():</b> It extracts the specified number of characters from given string.  <b>Example:</b>  SELECT MID(' Welcome world,4,,4);</p> <p><b>Output:</b>  Come</p> <p><b>4. DAYNAME():</b> It returns the weekday name for a given date  <b>Example:</b>  SELECT DAYNAME('2022-07-22');</p> <p><b>Output:</b>  Friday</p> <p><b>5. POWER():</b> It returns the value of a number raised to the power of another number.  <b>Example:</b>  SELECT POW(6,2);</p> <p><b>Output:</b>  36</p> <p><b>½ mark for each correct explanation</b>  <b>½ mark for each correct example</b></p>	
32	<p>I) Server should be installed in Admin department as it has maximum number of computers.</p> <p>II) Star topology</p> <div style="text-align: center;"> <pre> graph LR   ADMIN[ADMIN] --- EXAMINATION[EXAMINATION]   ADMIN --- ACCOUNTS[ACCOUNTS]   ADMIN --- RESULT[RESULT] </pre> </div> <p>III) Hub/Switch  IV) Dynamic  V) Video conferencing</p> <p style="text-align: center;"><b>1 Mark for each correct answer</b></p>	

33.	<pre>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()</pre> <p><b>½ mark for each correct statement</b>  <b>Python statement to save the chart:</b>  <pre>plt.savefig("aa.jpg")</pre> <b>1 mark for the correct statement</b></p> <p style="text-align: center;"><b>OR</b></p> <pre>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()</pre> <p><b>1 mark for each correct statement</b></p>	5										
34.	<p>i. SELECT LOWER(CNAME) FROM CLOTH;  ii. SELECT MIN(PRICE) FROM CLOTH;</p> <p><b>1 mark for each correct query</b></p> <p>iii. SELECT COUNT(*) FROM CLOTH GROUP BY SIZE HAVING  SIZE='M';</p> <p style="text-align: center;"><b>OR</b></p> <p>SELECT YEAR(DOP),COUNT(*) FROM CLOTH GROUP BY  YEAR(DOP);</p> <p style="text-align: center;"><b>2 marks for correct query</b></p>	1+1+2										
35.	<p>A. Output:</p> <p>i. (5,4)</p> <p>ii. School      tot_students      Topper      First_Runner_up</p> <table border="0" style="width: 100%;"> <tr> <td>CO3</td> <td>GPS</td> <td>20</td> <td>18</td> <td>2</td> </tr> <tr> <td>CO4</td> <td>MPS</td> <td>18</td> <td>10</td> <td>8</td> </tr> </table> <p style="text-align: center;"><b>1 mark for each correct output</b></p> <p>B. Python statement:  <pre>print(df.loc['CO2': 'CO4', 'Topper'])</pre></p> <p style="text-align: center;"><b>OR</b></p> <pre>print(df.Tot_students-df.First_Runnerup)</pre> <p><b>2 marks for correct Python statement</b></p>	CO3	GPS	20	18	2	CO4	MPS	18	10	8	1+1+2
CO3	GPS	20	18	2								
CO4	MPS	18	10	8								

## SAMPLE PAPER (2023-24)

**CLASS: XII**

**Max.Marks:70**

**SUBJECT: INFORMATICS PRACTICES (065)**

**Max.Time: 03:00 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 Q34 & Q35 against part c only.
8. All programming questions are to be answered using Python Language only.

SECTION A		
1.	Switch is a a) Broadcast device b) unicast device c) multicast d) None	1
2.	The act of fraudulently acquiring someone's personal and private information, such as online account names, login information and passwords is called as ..... a) Phishing b) Fraud c) Scam d) Plagiarism	1
3.	What is an example of not e-waste? a)Unused mobile phones b) Unused old ebooks c) Unused old computers d) Unrepairable hard disk	1
4.	All aggregate functions except_____ignore null values in their input collection. a) count (marks) b) count (*) c) avg(marks) d) sum(marks)	1

5.	If column “marks” contains the data set (50,80,75,50,80), what will be the output after the execution of the given query? SELECT COUNT (DISTINCT marks) FROM student; a)5 b)4 c)3 c)205	1
6.	Which one is not open source software: a)Mozilla Firefox b) Microsoft Word c) Open Office d) VLC Player	1
7.	Which of the following SQL statement do we use to find out the total number of records present in the table STUDENT? a) SELECT * FROM STUDENT; b) SELECT COUNT (*) FROM STUDENT; c) SELECT FIND (*) FROM STUDENT; d) SELECT SUM (Rows) FROM STUDENT;	1
8.	To display the jobs where the number of employees is less than 3. a) SELECT JOB, COUNT(*) FROM EMP WHERE COUNT(*) < 3; b) SELECT JOB, COUNT(*) FROM EMP WHERE COUNT(*) < 3 GROUP BY JOB; c) SELECT JOB, COUNT(*) FROM EMP GROUP BY JOB WHERE COUNT(*) < 3; d) SELECT JOB, COUNT(*) FROM EMP GROUP BY JOB HAVING COUNT (*) < 3;	1
9.	Which option cause a group function to consider only distinct values. a) All b) Distinct c) Unique d) Diverse	1
10.	To display firstfive rows of a series object ‘marks’, you may write: a)marks.Head() b)marks.Tail(5) c)marks.Head(5) d) None of the above	1
11.	Which of the following is not correct assuming Df is a dataframe with columns=[“Rollno”, “Name”, “Marks”, ”Grade”] and index=[“Stu1”,”Stu2”,”Stu3”,”Stu4”,”Stu5”] a) Df.loc[:, “Marks”:”Grade”] b) Df.loc[“Marks”] c) Df.loc[“Stu1”:”Stu3”] d) Df.iloc[0:3:2, 0:3]	1

12.	Which is not valid for Series Data Structure a) Series uses data as scaler values b) We cannot create empty Series object c) Series can be created using dictionary d) Series can be created using list of integers	1
13.	Which amongst the following is not an example of a browser? a) Chrome b) Lynx c) Edge d) Word Pad	1
14.	For conditionally retrieval of row from groups which clause is used? a) Where clause b) Having Clause c) Order By Clause d) (a) & (b) both	1
15.	The information/art/work that exists in digital form is called _____ a) e-work b) e-asset c) digital property d) e-property	1
16.	Smridh has recently changed his school so he is not aware of the people, but someone is posting negative, demeaning comments on his social media profile. He is also getting repeated mails from unknown people. Everytime he goes online, he finds someone chasing him online. Smridh is a victim of ..... : a). Eavesdropping b). Stolen identity c). Phishing d). Cyber stalking	1
Q17 and 18 are ASSERTION AND REASONING based questions. Mark the correct choice as a). Both A and R are true and R is the correct explanation for A b). Both A and R are true and R is not the correct explanation for A c). A is True but R is False d). A is false but R is True		
17.	Assertion (A): - The dynamic websites are faster than static website. Reasoning (R):- Dynamic websites usage more technologies than static web websites like PHP, .NET kind of server side scripting languages etc.	1
18.	Assertion (A):- Dataframe and Series both requires to import a package named pandas. Reasoning (R): - In Python if you wish to work with any function other than core functions of python then you need to import its package in the program.	1

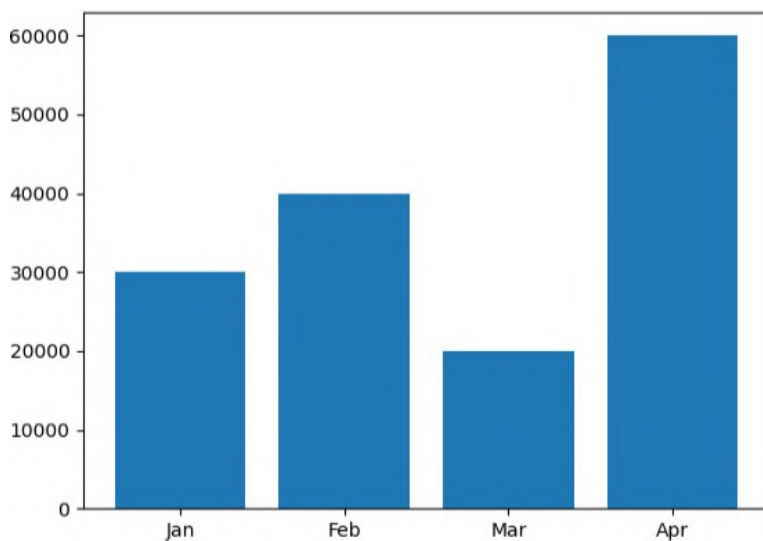


SECTION B																																
19	<p>Rashmi, a student is learning web technologies. Help her in understanding the difference between static website and dynamic website with the help of a suitable general example of each.</p> <p style="text-align: center;">OR</p> <p>What is the full form of URL? Identify domain name and URL from the following.  <a href="http://www.savegirlchild.in/home/aboutus.html">http://www.savegirlchild.in/home/aboutus.html</a></p>	2																														
20	<p>Consider the following table</p> <p style="text-align: center;">Table: STUDENT</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>RollNo</th> <th>Name</th> <th>DOB</th> <th>Gender</th> <th>City</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Gaurav</td> <td>1997-06-06</td> <td>M</td> <td>Mumbai</td> <td>430</td> </tr> <tr> <td>2</td> <td>Arti</td> <td>1994-05-07</td> <td>F</td> <td>Agra</td> <td>360</td> </tr> <tr> <td>3</td> <td>Rohan</td> <td>1997-05-06</td> <td>M</td> <td>Mumbai</td> <td>370</td> </tr> <tr> <td>4</td> <td>Abdul</td> <td>1995-08-03</td> <td>M</td> <td>Dubai</td> <td>432</td> </tr> </tbody> </table> <p>Write output of the following queries-</p> <p>a) SELECT UPPER(LEFT(NAME,2)) FROM STUDENT WHERE GENDER='M';</p> <p>b) SELECT ROUND(MARKS, -2) FROM STUDENT WHERE DOB LIKE "%5%";</p>	RollNo	Name	DOB	Gender	City	Marks	1	Gaurav	1997-06-06	M	Mumbai	430	2	Arti	1994-05-07	F	Agra	360	3	Rohan	1997-05-06	M	Mumbai	370	4	Abdul	1995-08-03	M	Dubai	432	2
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21	<p>Rumana is confused between Where and Having clause. She knows that both the clauses are used to filters the rows based on a condition? Help her in differentiating between both the clauses with example.</p>	2																														
22	<p>Consider the following dataframe df1 –</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>xyz</td> <td>mno</td> </tr> <tr> <td>A</td> <td>20</td> <td>30</td> </tr> <tr> <td>B</td> <td>40</td> <td>50</td> </tr> <tr> <td>C</td> <td>60</td> <td>70</td> </tr> </table> <p>Write python code to create df1 using only list.</p>		xyz	mno	A	20	30	B	40	50	C	60	70	2																		
	xyz	mno																														
A	20	30																														
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C	60	70																														
23	<p>Ankita received an SMS, from her bank querying a recent transaction asking her pin number. Answer the following questions as what she should do upon receiving the SMS:</p> <p>a. Should she SMS her pin number to the given contact number?</p> <p>b. Should she call the bank helpline number to recheck the validity of the SMS received?</p> <p style="text-align: center;">OR</p> <p>List any 2 ways related to e-waste management.</p>	2																														
24	<p>A Series object is created with the following details</p> <p><b>obj1</b></p> <p>a 5</p> <p>b 10</p> <p>c 15</p> <p>d 20</p>	2																														

	<p>What will be the output of following commands</p> <p>a) obj1&gt;15</p> <p>b) obj1[obj1&gt;15]</p>																										
25	<p>Write python code to create following dataframe-</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>ITEM</th> <th>COMPANY</th> <th>RUPEES</th> <th>USD</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>TV</td> <td>LG</td> <td>12000</td> <td>700</td> </tr> <tr> <td>101</td> <td>TV</td> <td>VIDEOCON</td> <td>10000</td> <td>650</td> </tr> <tr> <td>102</td> <td>AC</td> <td>LG</td> <td>15000</td> <td>800</td> </tr> <tr> <td>103</td> <td>AC</td> <td>SONY</td> <td>14000</td> <td>750</td> </tr> </tbody> </table> <p>a) Write python code to create above dataframe</p> <p>b) Write python code to display items whose price is more than 700 USD.</p>		ITEM	COMPANY	RUPEES	USD	100	TV	LG	12000	700	101	TV	VIDEOCON	10000	650	102	AC	LG	15000	800	103	AC	SONY	14000	750	2
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<b>SECTION C</b>																											
26	<p>Ajay is working with following table in MySQL. He is dealing with date functions. Help him predicting the output of the following</p> <p>Table: PRODUCT</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>PID</th> <th>PNAME</th> <th>PRICE</th> <th>DOP</th> </tr> </thead> <tbody> <tr> <td>101</td> <td>Keyboard</td> <td>500</td> <td>2021-09-15</td> </tr> </tbody> </table> <p>a) SELECT MONTHNAME(DOP) FROM PRODUCT;</p> <p>b) SELECT DAY(DOP) FROM PRODUCT;</p> <p>c) SELECT YEAR(DOP) + 1 FROM PRODUCT;</p>	PID	PNAME	PRICE	DOP	101	Keyboard	500	2021-09-15	3																	
PID	PNAME	PRICE	DOP																								
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27	<p>Consider the two objects s1 and s2. s1 is a list whereas s2 is a Series. Both have values 10, 20, 30, 40, 50.</p> <p>What will be the output of the following two statements considering that the above objects have been created already</p> <p>a). print(s1 * 2)</p> <p>b). print(s2 * 2)</p> <p>c). print(s2 &gt; 40)</p>	3																									
28	<p>What is output of the following code ?</p> <pre>import pandas as pd import numpy as np #Create a Dictionary of series d = {'Name':pd.Series(['Sachin','Dhoni','Virat','Rohit','Shikhar']), 'Age':pd.Series([26,25,25,24,31]), 'Score':pd.Series([87,67,89,55,47])} #Create a DataFrame df= pd.DataFrame(d) print (df[['Name','Age']]) print (df[df["Score"]&gt;80]) print(df.loc[0:2,"Name":'Age'])</pre>	3																									
29	How the excessive use of Technology affected the health of human beings?	3																									

	<p>Explain.</p> <p style="text-align: center;">OR</p> <p>What do you mean by Cyber Crime? Explain with the help of an example.</p>	
30	<p>Consider a table PRODUCT with the attributes PID, PNAME, PRICE and DOP (date of purchase). Suggest suitable SQL function for the same. Also write the query to achieve the desired task.</p> <p>a). To count number of rows in the table.  b). To display the day name on which product was purchased  c). To display first 3 characters of product name.</p> <p style="text-align: center;">OR</p> <p>Discuss the significance of Group by clause in detail with the help of suitable example.</p>	3
<b>SECTION D</b>		
31	<p>Write suitable SQL query for the following:</p> <p>a). Display 3rd to 7th characters from the string 'INFORMATION'.  b) Display the last 5 characters from the string 'HELLO WORLD'.  c). Round off the value 126.5256 to 3 decimal places.  d). Display the current date and time.  e). Remove all the expected leading spaces from a column SNAME of the table STUDENT.</p> <p style="text-align: center;">OR</p> <p>Explain the following SQL functions using suitable examples.</p> <p>a). NOW()  b) ROUND()  c). INSTR()  d). MONTHNAME()  e) MOD()</p>	5
32	<p>A software development company has set up its new centre at Lucknow for its office and web based activities. It has 4 blocks of buildings named Block A, Block B, Block C and Block D</p> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="border: 1px solid black; padding: 10px; width: 150px; height: 50px; display: flex; align-items: center; justify-content: center;">Block - A</div> <div style="border: 1px solid black; padding: 10px; width: 150px; height: 50px; display: flex; align-items: center; justify-content: center;">Block - B</div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="border: 1px solid black; padding: 10px; width: 150px; height: 50px; display: flex; align-items: center; justify-content: center;">Block - C</div> <div style="border: 1px solid black; padding: 10px; width: 150px; height: 50px; display: flex; align-items: center; justify-content: center;">Block - D</div> </div>	5

	<table border="1"> <tr> <th>Block</th> <th>No. of Computers</th> </tr> <tr> <td>A</td> <td>25</td> </tr> <tr> <td>B</td> <td>50</td> </tr> <tr> <td>C</td> <td>125</td> </tr> <tr> <td>D</td> <td>10</td> </tr> </table> <p>Distances between various Blocks in meters:</p> <table border="1"> <tr> <td>Block A to Block B</td> <td>60 m</td> </tr> <tr> <td>Block B to Block C</td> <td>40 m</td> </tr> <tr> <td>Block C to Block A</td> <td>30 m</td> </tr> <tr> <td>Block D to Block C</td> <td>50 m</td> </tr> </table> <p>a) Suggest the most appropriate location of the server inside the campus (out of the four buildings) to get the best connectivity for maximum number of computers. Justify your answer.</p> <p>b) Suggest the draw the cable layout to efficiently connect various blocks,</p> <p>c) Which networking device will you suggest to be procured by the company to interconnect all the computers of various buildings?</p> <p>d) The company wants to connect its head office located in Karnataka. What type of network will be chosen out of the followings to connect the head office? LAN, MAN, WAN, PAN</p> <p>e) 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</p>	Block	No. of Computers	A	25	B	50	C	125	D	10	Block A to Block B	60 m	Block B to Block C	40 m	Block C to Block A	30 m	Block D to Block C	50 m	
Block	No. of Computers																			
A	25																			
B	50																			
C	125																			
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Block A to Block B	60 m																			
Block B to Block C	40 m																			
Block C to Block A	30 m																			
Block D to Block C	50 m																			
33	<p>Given a dataframe df2 as shown below</p> <table border="1"> <thead> <tr> <th>App_Name</th> <th>App_Price</th> <th>Total_Downloads</th> </tr> </thead> <tbody> <tr> <td>Angry Bird</td> <td>75</td> <td>197000</td> </tr> <tr> <td>Teen Titan</td> <td>120</td> <td>209000</td> </tr> <tr> <td>Marvel Comics</td> <td>190</td> <td>414000</td> </tr> <tr> <td>ColorMe</td> <td>245</td> <td>196000</td> </tr> </tbody> </table> <p>Divide downloads by 1000 each. Now create a line chart that plots separate line for price and downloads in a single graph OR</p> <p>Draw the following bar graph representing the Sales of each month.</p>	App_Name	App_Price	Total_Downloads	Angry Bird	75	197000	Teen Titan	120	209000	Marvel Comics	190	414000	ColorMe	245	196000	5			
App_Name	App_Price	Total_Downloads																		
Angry Bird	75	197000																		
Teen Titan	120	209000																		
Marvel Comics	190	414000																		
ColorMe	245	196000																		



**SECTION E**

34 Consider the following table Doctor. Write the SQL commands for the following: 1+1+2

TABLE: DOCTOR

Docid	DocName	DOJ	OPDDays	Deptid
D101	Raman Kumar	2018-01-15	TTS	1
D102	Avinash Singh	2018-06-01	MWF	1
D103	SurajMaharaj	2017-07-01	MWF	3
D104	Sameeksha Gupta	2018-06-01	TTS	2
D105	NishaJuneja	2018-04-07	TTS	4
D106	Ritu Pal	2017-02-01	TTS	2
D107	Arti Gupta	2019-01-01	MWF	4

Write SQL commands for the following

- To display doctor's name in upper case.
- To display doctor name and month name in which doctor joined.
- To display doctors detail whose name contain 'a' as second character.

OR

To display count of doctors opd days wise.

35 Consider the following DataFrame df3 1+1+2

	Population	Hospital	Schools
Delhi	10279871	189	7916
Mumbai	12691810	208	8508
Kolkata	4618110	149	7226
Chennai	4319617	157	7617

- Display the columns Hospital & Schools
- Display the details of Mumbai ,Kolkata, Chennai
- Display population & hospital column for Delhi & Mumbai

OR

Write a python statement to print the details of city having the no.of hospital is more than 150.

## MARKING SCHEME

**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 Q34 & Q35 against part c only.
8. All programming questions are to be answered using Python Language only.

SECTION A		
1.	b) unicast device	1
2.	a) Phishing	1
3.	b) Unused old ebooks	1
4.	b) count (*)	1
5.	c)3	1
6.	b) Microsoft Word	1
7.	b) SELECT COUNT (*) FROM STUDENT;	1
8.	d) SELECT JOB, COUNT(*) FROM EMP GROUP BY JOB HAVING COUNT (*) < 3;	1
9.	b) Distinct	1
10.	d)None of the above	1
11.	b) Df.loc[“Marks”]	1
12.	b) We cannot create empty Series object	1
13.	d) Word Pad	1

14.	b) Having Clause	1								
15.	c) digital property	1								
16.	d) Cyber stalking	1								
17.	d). A is false but R is True	1								
18.	a). Both A and R are true and R is the correct explanation for A	1								
<b>SECTION B</b>										
19	<p><b>1 mark each for correct definition of dynamic and static website</b>  <b>OR 2 mark for correct difference</b></p> <p style="text-align: center;">OR</p> <p>Full Form of URL : Uniform Resource Locator  Domain Name: www.savegirlchild.in  URL : http://www.savegirlchild.in/home/aboutus.html</p> <p><b>1 mark for full form of URL</b>  <b>½ mark each for domain name and url</b></p>	2								
20	<p>a)</p> <table border="1" style="margin-left: 20px;"> <tr><td>UPPER(LEFT(NAME,2))</td></tr> <tr><td>GA</td></tr> <tr><td>RO</td></tr> <tr><td>AB</td></tr> </table> <p>b)</p> <table border="1" style="margin-left: 20px;"> <tr><td>ROUND(MARKS, -2)</td></tr> <tr><td>400</td></tr> <tr><td>400</td></tr> <tr><td>400</td></tr> </table> <p><b>1 mark each for correct answer</b></p>	UPPER(LEFT(NAME,2))	GA	RO	AB	ROUND(MARKS, -2)	400	400	400	2
UPPER(LEFT(NAME,2))										
GA										
RO										
AB										
ROUND(MARKS, -2)										
400										
400										
400										
21	<p>1 mark each for correct definition of where and having clause with example</p> <p>OR 2 mark for correct difference with example</p>	2								
22	<pre>import pandas as pd df=pd.DataFrame([[20,30],[40,50],[60,70]], columns=["xyz", "mno"], index=["A","B","C"])</pre> <p><b>2 mark for correct answer</b></p>	2								
23	<p>a. No  b. Yes</p> <p><b>1 mark each for correct answer</b></p> <p style="text-align: center;">OR</p> <p><b>1 mark each for correct answer of e-waste</b></p>	2								
24	<p>a)  a False</p>	2								

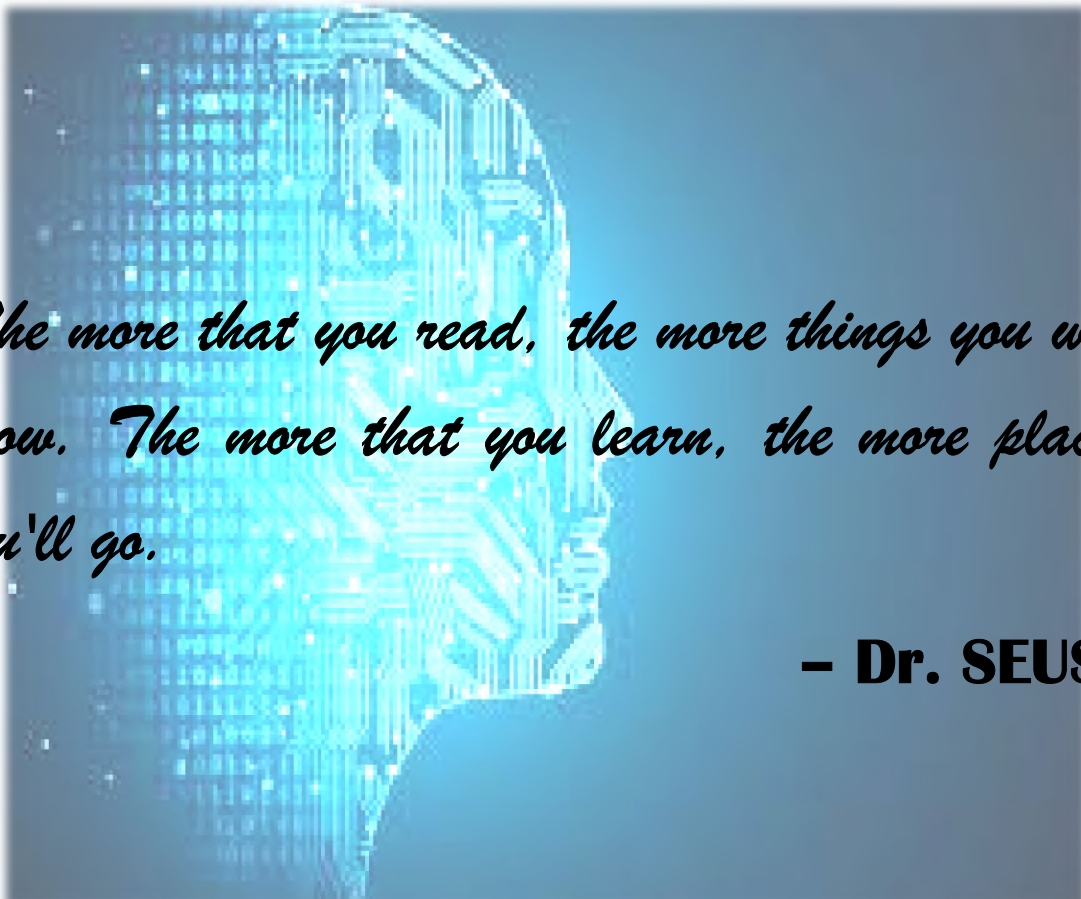
	b False c False d True dtype: bool  b) d 20 dtype: int64  <b>1 mark each for correct answer</b>	
25	a) <pre>import pandas as pd data={"ITEM": ["TV", "TV", "AC", "AC"],       "COMPANY":["LG", "VIDEOCON", "LG", "SONY"],       "RUPEES":[12000,10000,15000,14000],       "USD": [700,650,800,750]} df=pd.DataFrame(data, index=[100,101,102,103])</pre> b) <pre>print(df[df["USD"]&gt;700])</pre> <b>1 mark each for correct answer</b>	2
<b>SECTION C</b>		
26	a) September b) 15 c) 2022 <b>1 mark each for correct answer</b>	3
27	a) [10, 20, 30, 40, 50, 10, 20, 30, 40, 50]  b) 0 20 1 40 2 60 3 80 4 100 dtype: int64  c) 4 50 dtype: int64  <b>1 mark each for correct answer (ignore if dtype is not written)</b>	3
28	<pre>      Name  Age 0  Sachin  26 1 Dhoni   25 2 Virat   25 3 Rohit   24 4 Shikhar 31</pre>	3



	<table> <thead> <tr> <th></th> <th>Name</th> <th>Age</th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Sachin</td> <td>26</td> <td>87</td> </tr> <tr> <td>2</td> <td>Virat</td> <td>25</td> <td>89</td> </tr> </tbody> </table> <table> <thead> <tr> <th></th> <th>Name</th> <th>Age</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Sachin</td> <td>26</td> </tr> <tr> <td>1</td> <td>Dhoni</td> <td>25</td> </tr> <tr> <td>2</td> <td>Virat</td> <td>25</td> </tr> </tbody> </table> <p><b>1 mark each for correct output</b></p>		Name	Age	Score	0	Sachin	26	87	2	Virat	25	89		Name	Age	0	Sachin	26	1	Dhoni	25	2	Virat	25	
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1	Dhoni	25																								
2	Virat	25																								
29	<b>3 mark for correct answer</b>	3																								
30	<p>a)SELECT COUNT(*) FROM PRODUCT;  b)SELECT DAYNAME(DOP) FROM PRODUCT;  c)SELECT LEFT(PNAME, 3) FROM PRODUCT;</p> <p><b>1 mark each for correct answer</b></p> <p style="text-align: center;">OR</p> <p><b>2 mark each for correct explanation</b>  <b>1 mark for each suitable example</b></p>	3																								
<b>SECTION D</b>																										
31	<p>a)SELECT SUBSTR('INFORMATION', 3, 5) ;  b)SELECT RIGHT('HELLO WORLD', 5) ;  c)SELECT ROUND(126.5256, 3);  d)SELECT NOW();  e)SELECT TRIM(SNAME) FROM STUDENT;</p> <p><b>1 mark each for correct answer</b></p> <p style="text-align: center;">OR</p> <p><b>1/2 mark each for correct explanation</b>  <b>1/2 mark for each suitable example</b></p>	5																								
32	<p>a) Most suitable place to host a server is Block-C as it has maximum number of computer hence it reduces the traffic between the buildings. Most of the traffic is within the building Block-C.</p> <p>b)</p> <div style="text-align: center;"> <pre> graph TD     A[Block - A] --- C[Block - C]     B[Block - B] --- C     C --- D[Block - D] </pre> </div> <p>c) Switch  d) WAN  e) Video Conferencing</p>	5																								

	<b>1 mark for correct answer</b>	
33	<pre>import pandas as pd import matplotlib.pyplot as plt import numpy as np data={"App_Name":[], "App_Price":[], "Total_Downloads":[]} df2=pd.DataFrame(data) x=np.arange(4) price=df2.App_Price downloads=df2.Total_Downloads/1000 plt.plot(x, price, label="Price") plt.plot(x, downloads, label="Downloads") plt.legend() plt.show()</pre> <p><b>1 mark for correct import</b>  <b>1 mark for correct data preparation i.e. divide by 1000</b>  <b>1 mark for correct plot for price</b>  <b>1 mark for correct plot for downloads</b>  <b>1 mark for correct show</b></p> <p style="text-align: center;">OR</p> <pre>import matplotlib.pyplot as plt import numpy as np x=np.arange(4) sales=[30000,40000,20000,60000] plt.xticks(x, ["Jan", "Feb", "Mar", "Apr"]) plt.bar(x, sales) plt.show()</pre> <p><b>1 mark for correct import</b>  <b>1 mark for correct data preparation</b>  <b>1 mark for correct bar method</b>  <b>1 mark for correct xticks</b>  <b>1 mark for correct show</b></p>	5
<b>SECTION E</b>		
34	<p>a) SELECT UCASE(DOCNAME) FROM DOCTOR.  b) SELECT DOCNAME, MONTHNAME(DOJ) FROM DOCTOR;  c) SELECT * FROM DOCTOR WHERE DOCNAME LIKE "_a%";</p> <p style="text-align: center;">OR</p> <p>SELECT OPDDAYS, COUNT(*) FROM DOCTOR GROUP BY OPDDAYS;</p> <p><b>1 mark each for correct answer of a) &amp; b)</b>  <b>2 mark for correct answer for c)</b></p>	1+1+2
35	a) print(df3[["Hospital", "Schools"]])	1+1+2

<p>b) <code>print(df3.loc[“Mumbai”:“Chennai”])</code> c) <code>print(df3.loc[“Delhi”:“Mumbai”, “Population”:“Hospital”])</code> OR <code>print(df3[df3[“Hospital”]&gt;150])</code></p> <p><b>1 mark each for correct answer of a) &amp; b)</b> <b>2 mark for correct answer for c)</b></p>	
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*'The more that you read, the more things you will know. The more that you learn, the more places you'll go.*

**- Dr. SEUSS**

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