STUDY MATERIAL
CLASS XII
INFORMATICS PRACTICES

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BENGALURU REGION

MESSAGE FROM HONORABLE DEPUTY COMMISSIONER

Dear students and teachers!

It is a matter of great pride and delight that KVS Bengaluru Region is putting forward the Students' Support Material (SSM) for class XII subject Informatics Practices for the session 2024-25. I believe firmly that the subject experts have left no stone unturned to enable our students to add on more to their quality of performance by deep rooting more towards accessing required understating in the subject. Certainly, use of this SSM will help students in empowering themselves as one of the tools and will lead in bringing success.

With devotion, dedication & persistent hard work the team of experts has crafted out this SSM meticulously to complement the classroom learning experience of the students as well as to cope up with the Competency Based Questions as per the new pattern of examinations aligned with NEP-2020 and NCFSE-2023. This SSM, being well-structured and presented in a manner which makes it to be comprehended easily, will serve as a precious supplement for self-study of students.

I am pleased to place on record my appreciation and commendation for the commitment and dedication of the team comprising of the subject experts in carving out such a useful edition of Students' Support Material for the students.

Wishing all the best

(DHARMENDRA PATLE)
DEPUTY COMMISSIONER
KVS BENGALURU REGION

OUR SUPPORT, GUIDANCE & MOTIVATION

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SUBJECT SUPPORT MATERIAL
INFORMATICS PRACTICES
SESSION 2024-25

CONTENT PREPARATION TEAM

SR.NO	NAME OF TEACHER	NAME OF UNIT
1	Mrs. Divya C.K K.V 1 Jalahalli	Data Handling using Pandas
2	Mrs. Sonia Arora K.V. Karwar	Data Visualization
3	Mrs. Preeti Sarkar K.V MG RLY	Database Query using SQL
4	Mr. Amit Kumar Sinha KV Malleswaram	Introduction to Computer Networks
5	Mrs. Pooja Khare K.V. ASC Centre	Societal Impacts
6	Mr. Ashok Sen Gupta K.V 1 Jalahalli	Review Team Member
7	Mrs. Sumitha KV MEG & Centre	Review Team Member
8	Mr. Goverdhan Satish K.V Mysuru	Review Team Member

COORDINATOR

MR. MANISH SAINI

PRINCIPAL, KV TUMKUR

Informatics Practices (2024-25)
CLASS XII Code No. 065

1. Learning Outcomes

At the end of this course, students will be able to:

- Create Series, Data frames and apply various operations.
- Visualize data using relevant graphs.
- Design SQL queries using aggregate functions.
- Import/Export data between SQL database and Pandas.
- Learn terminology related to networking and internet.
- Identify internet security issues and configure browser settings.
- Understand the impact of technology on society including gender and disability issues.

2. Distribution of Marks and Periods

Unit No	Unit Name	Marks	Periods Theory	Periods Practical	Total Period
1	Data Handling using Pandas and Data Visualization	25	25	25	50
2	Database Query using SQL	25	20	17	37
3	Introduction to Computer Networks	10	12	-	12
4	Societal Impacts	10	14	-	14
	Project	-	-	7	7
	Practical	30	-	-	-
	Total	**100**	**71**	**49**	**120**

3. Unit Wise syllabus

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 networks: 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.

UNIT- 1

Data Handling using Pandas -I

INTRODUCTION TO PYTHON PANDAS

- It is python's library for data analysis
- Pandas-> Panel Data System
- It is used for evaluating big data
- Author of Pandas is Wes Mckinney

Before using any functionality, this module need to be imported as

import pandas as pd

- **Advantages of pandas:**
  - It can read or write in different data formats
  - It can calculate in all ways data is organised ie, across rows and columns
  - It can select subsets of data from bulky data sets
  - It can find and fill all missing data.
  - It supports reshaping of data in to different forms

Some functionalities of pandas may return the result in the form of numpy arrays. So you must have a thorough knowledge of numpy arrays.

- **Python numpy (Numeric Python)**
  - It has homogeneous list of elements
  - Vectorised operations can be performed
  - It has two types
    1. 1 D array
    2. 2 D array
- **Creations of arrays**

To create both 1-D and 2-D arrays, the module to be imported is:

import numpy as np

- **Creating 1-D and 2-D arrays:**
  - 1-D array

```
import numpy as np
A=np.array([1,2,3,4])
print(A)
```

  - 2-D array

```
import numpy as np
A=np.array([[1,2,3],[4,5,6],[7,8,9]])
print(A)
```

- **Working with numpy pandas**

PANDAS DATA STRUCTURES

➢ **Data structure:**

It is a way of storing and organising data in specific manner.
Eg: Array,Stack,Queue etc
Pandas uses two datastructures:

- **Series**
- **Dataframes**

➢ **PANDAS SERIES DATASTRUCTURE**

While working with pandas we generally import pandas module but if requirement of numpy is needed, then both can be imported by using the following import statements:

import pandas as pd
import numpy as np

- A series is a pandas data structure that represents a one dimensional array like object containing an array of data and an associated array of data labels called its index.
- ie A series type object has the following two main components:
  - an array of actual data
  - an associated array of indexes or data labels
  - Both components are 1-D arrays with the same length

Eg:

Index	data
0	10
1	11
2	12
3	13
4	14

Creating Series objects:

- A series type object can be created in many ways using pandas library function **Series()**
- **Various ways of creating Series Objects**
  - **Creating empty Series object by using just the Series()** with no parameter

To create an empty object having no values, you can just use Series() as:

Series object= pandas.Series()

This will create an empty series type object with no value having default datatype as float64.

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

OUTPUT
Series([], dtype: float64)

- **Creating non empty Series objects:**

Here you need to specify arguments for data and index as per the syntax:

Series object= pandas.Series(data,index=idx)

Eg:

```
import pandas as pd
import numpy as np
S1=pd.Series(['Anjali','Arunima','Chaithra','Diya'])
print(S1)
```

OUTPUT

0 Anjali
1 Arunima
2 Chaithra
3 Diya

Eg:2

```
import pandas as pd
import numpy as np
l=[31,28,31,30,31]
ind=['Jan','Feb','Mar','Apr','May']
obj=pd.Series(l,ind)
print(obj)
```

OUTPUT

Jan 31
Feb 28
Mar 31
Apr 30
May 31

Where data is the data part of the Series object and it can be any one of the following:

1. A python sequence:

Syntax:

Series object= pandas.Series(any python sequence)

This will return an object of series type:

Eg: 1

```
import pandas as pd
import numpy as np
obj=pd.Series(range(2,10,2))
print(obj)
```

OUTPUT

0	**2**
1	**4**
2	**6**
3	**8**

Eg:2

```
import pandas as pd
import numpy as np
obj=pd.Series([2.5,3.,3.5,4.,4.5])
print(obj)
```

OUTPUT

0	**2.5**
1	**3.0**
2	**3.5**
3	**4.0**
4	**4.5**

2. An ndarray

Eg:

```
import pandas as pd
import numpy as np
A=np.array([2,4,6,8])
obj=pd.Series(A)
print(obj)
```

OUTPUT

0	**2**
1	**4**
2	**6**
3	**8**

3. A python Dictionary

Here the parameter inside a Series() function will be a dictionary.
Syntax:
Series object= pandas.Series(any python dictionary)
Eg:

```
import pandas as pd
import numpy as np
S=pd.Series({"ahil":12,"abhay":9,'mohit':8,'anjali':10})
print(S)
```

```
OUTPUT
ahil      12
abhay      9
mohit      8
anjali     1
dtype: int64
```

Since you are creating a series object from a dictionary object, then indexes are created from the keys of the dictionary and values will be the data part.

4. A Scalar value

Scalar value means the data will be in the form of a single value. The following points may be noted while you create a series object from a scalar value:

i. If data is a scalar value then index need to be provided.
ii. There can be more than one entry for index value
iii. If index is more than one value then the scalar value will be repeated to match it with the length of index.

Eg:1

```
import pandas as pd
import numpy as np
S=pd.Series(10)
print(S)
```

```
OUTPUT
    0   10
dtype: int64
```

Eg:2

```
import pandas as pd
import numpy as np
S=pd.Series(10,index=[1,2])
print(S)
```

```
OUTPUT
    1   10
    2   10
dtype: int64
```

Creating Series Objects with some additional functionality

Specifying NaN values in a series object:

If you want to create a series object, but if some data are missing still you can create the series object with NaN(Not a Number) value. NaN is defined in mumpy module and can be invoked by numpy.NaN

Eg:

```
import pandas as pd
import numpy as np
ob=pd.Series([5,10,np.nan,25])
print(ob)
```

OUTPUT

```
0    5.0
1   10.0
2    NaN
3   25.0
dtype: float64
```

Specifying data as well as index value with Series()

Here both data and index have to be sequences. None is taken if you skip these parameters

Eg:1

```
import pandas as pd
import numpy as np
S=pd.Series(data=[10,15,20,25],index=[1,2,3,4])
print(S)
```

OUTPUT

```
1    10
2    15
3    20
4    25
dtype: int64
```

Eg:2

```
import pandas as pd
import numpy as np
l=[10,15,20,25]
i=[1,2,3,4]
S=pd.Series(data=l,index=i)
print(S)
```

Output will be same as above.

Accessing a Series Object and its elements

Consider the following series objects:

obj5	
Feb	28
Jan	31
Mar	31

obj6	
0	11
1	14
2	17
3	20
4	23

obj7	
9	18
10	20
11	22
12	24

obj8	
9	81
10	100
11	121
12	144

- **Accessing individual elements**

To access the individual elements of a series object, use the following syntax:

Seriesobject[valid index]

Eg: obj6[3] will give result as 20
obj7[9] will give result as 18
obj8[11] will give result as 121
obj5['Feb'] will give result as 28

All the above examples we have used legal index values. Since creation of seriess object with repeated index values are allowed in python accessing such a repeated index value returns all entries with that index eg:

If series object ob3 is created as follows:

obj3	
a	2.75
b	12.5
a	22.25
a	32.0
b	41.75

If you write the statement ob3['b'] output will be:

```
b    12.5
b    41.75
```

If you try to give an index which is not legal index for a series object, it will give an error.

Extracting Slices from a Series Object:

Slicing is a powerful way to retrieve subsets of a data from a pandas object. One important point to note is that slicing take **place position wise and not the index wise** in a series object.
In every series object internally there is a position associated with each element where first element is assigned position 0, second element gets position 1 and so on....
For eg: the above defined **series object obj7** has the position as follows:

Position	**obj7**	
0	9	18
1	10	20
2	11	22
3	12	24

Syntax for series object slicing is:

Seriesobject[start:stop:step] **where start and stop are position not index**

Eg: import pandas as pd
import numpy as np
obj7=pd.Series(data=[18,20,22,24],index=[9,10,11,12])
print(obj7)
print(obj7[0:2])

OUTPUT

```
9   18
10  20
11   22
 12  24
dtype: int64
```

```
9   18
10  20
dtype: int64
```

Operations on Series Object:

- **Modifying Elements of Series Object**

The data value of a series object can be easily modified by the following syntax:

Seriesobject[index]=new data value

Eg:
Considering the above Series Object obj7 if we write obj7[11]=23

Output will be:

```
9    18
10   20
11    23
 12   24
```

You can even modify the data values within a given slice with the syntax:
Seriesobject[start:stop:step]=new data value

Eg:

```
#modifying series object
import pandas as pd
import numpy as np
obj7=pd.Series(data=[18,20,22,24],index=[9,10,11,12])
print(obj7)
obj7[0:2]=18
print(obj7)
```

OUTPUT will be:

```
9  18
10 20
11 22
12 24
dtype: int64
```

```
9  18
10 18
 11 22
12 24
dtype: int64
```

Do remember if you are using slicing you need to specify position not index.

You can even change indexes of a series by assigning new index array to its index with the **syntax:**

Object.index=new array index

Eg to change the index of the above defined series object obj7 from 9,10,11,12 to 1,2 3,4 you

can write the statement as

Obj7.index=[1,2,3,4]

The **output** will be :

```
1  18
2  20
3  22
4  24
```

Please note that you can modify Series objects values but not its size. Any mismatch it raises an error.

So series objects are value mutable but size immutable.

- **The head() and tail() functions of series object:**

The head() function is used to fetch first n rows from a pandas object and tail() function returns the last n rows from a pandas object. The syntax to use these functions are:

Seriesobject.head([n])

Seriesobject.tail([n])

If parameter n is not specified then head() and tail() will return first 5 and last 5 rows of pandas series object.

Eg:
If obj1 contains the following data:

obj1	
0	2
1	5
2	8
3	11
4	13
5	15
6	18
7	19
8	21
9	24
10	26

Then,
print(obj1.head())
print(obj1.tail()) will give the output as:

```
0   2
1   5
2   8
3  11
4  13
dtype: int64
```

```
6  18
 7 19
8  21
9  24
10 26
 dtype: int64
```

And if the statements are :
print(obj1.head(3))
print(obj1.tail(2)) then output will be:

```
0  2
1  5
2  8
dtype: int64
```

```
9   24
10  26
dtype: int64
```

Vector operation on series object:

Vector operation means if you apply a function or expression, then its individually applied on each item of the object. Since series objects are built on Numpy Arrays they also support vectorised operations.

Eg: import pandas as pd

import numpy as np

obj1=pd.Series(data=[18,20,22,24],index=[9,10,11,12])

print(obj1)

print(obj1+2)

print(obj1**2)

Output will be:

```
9  18
 10 20
11 22
12 24
dtype: int64
```

```
9 20
10 22
11 24
12 26
dtype: int64
```

```
9 324
10 400
11 484
12 576
dtype: int64
```

Arithmetic on series object:

Arithmetic operations like addition,subtraction,multiplication and division can be performed with two series objects provided both the series object should match with their index. If indexes are not matching it will return NaN as the result.

For Eg:

Consider the following Series objects:

ob1	
0	2
1	8
2	11
3	6
4	20

ob2	
a	1.5
b	12.5
c	24.0
d	35.5
e	20.2

ob3	
0	2.75
1	12.5
2	32.2
3	8.1
4	16.5

ob4	
0	1
1	3
2	5
3	7
4	9
5	11
6	13

ob5	
a	10
b	20
c	30
d	40
e	50

The output of the following statements will be:

print(obj1+obj3) (Addition cab be performed since their index are matching.)

```
0   4.75
1  20.50
2  43.20
3  14.10
4  36.50
dtype: float64
```

print(obj2*obj5)(Multiplication can be performed since index are matching)

Output will be:

```
a   15.0
B  250.0
c   720.0
D  1420.0
e  1010.0
dtype: float64
```

print(obj3+obj4)(There are non matching indexes, here it will add values of matching index and returns NaN for non matching index)
Output will be:

```
0   3.75
1  15.50
2  37.20
3  15.10
4  25.50
5    NaN
6    NaN
dtype: float64
```

- **Some additional operations on series objects:**
  - **Re-indexing:**

    Sometimes you want to create a similar object but with a different order of same indexes. You can use the syntax:

    Seriesobject=object.reindex(sequence with new order of indexes)

    With this the same data values and their indexes will be stored in the new object as per the defined order of index.
    Eg:

```
import pandas as pd
import numpy as np
obj1=pd.Series(data=[2,8,11,6,20],index=[0,1,2,3,4])
obj2=obj1.reindex([2,3,1,4,0])
print(obj2)
```

```
OUTPUT:
2   11
3    6
1    8
4   20
0    2
```

Difference between Numpy arrays and Series objects:

- **In ndarrays vectorised operations can be performed only if the shapes of two ndarrays match. Otherwise it returns an error. But with series objects, in case of vectorised operations the matching indexes data are processed and for non-matching indexes NaN is returned.**
- **In ndarays indexes are always numeric staring from 0 onwards but in series object we can have any type of indexes including numbers, strings etc**

SAMPLE QUESTIONS ON SERIES

1.	State True or False: Series are Two dimensional data structures in pandas.
Ans	False
2.	Series data structure in python are size _____ and value _____. a. Mutable, immutable b. Mutable, mutable c. immutable, mutable d. immutable, immutable
Ans	c
3.	Name the module to be imported in a python program for creating a series data structure?
Ans	Import pandas as pd
4.	Considering the series object S with the contents below: 0 10 1 20 2 30 3 40 Find print(S*2)
Ans	0 20 1 40 2 60 3 80
5.	Which function in series object is used to display first 5 rows of a series object S? a. S.Head() b. S.head() c. Head() d. S.head
Ans	b
6.	Which one of the following is not a valid Series declaration? a) S=pandas.Series([4,5,3,4]) b) S=pandas.Series(20,index=['M','B','P']) c) S=pandas.Series({'A':10}) d) S=pandas.Series(10,20,30, index=['A', 'B', 'C'])
Ans	d
7.	Name the module to which the following functions belong to: a. array()
Ans	numpy
8.	Questions 8 is an 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 Assertion: The mathematical operations can be performed in series and returns NaN if the index does not match Reasoning: The series required the same index for both series for successful arithmetic operation.
Ans	i) Both A and R are true and R is the correct explanation for A
9.	Consider the given series P:

	<table><tr><th>Index</th><th>Data</th></tr><tr><td>Jan</td><td>31</td></tr><tr><td>Feb</td><td>28</td></tr><tr><td>Mar</td><td>31</td></tr><tr><td>Apr</td><td>30</td></tr></table> Write a program in python pandas to create the above series P.
Ans	import pandas as pd P=pd.Series([31,28,31,30],index=[“Jan”,”Feb”,”Mar”,”Apr”]) print(P)
10.	Consider a given Series , Subject: <table><tr><th>INDEX</th><th>MARKS</th></tr><tr><td>ENGLISH</td><td>75</td></tr><tr><td>HINDI</td><td>78</td></tr><tr><td>MATHS</td><td>82</td></tr><tr><td>SCIENCE</td><td>86</td></tr></table> Write a program in Python Pandas to create this series.
Ans	import pandas as pd Subject=pd.Series({“English”:75,”Hindi”:78,”Maths”:82,”Science”:86}) print(Subject)
11.	Find the errors in the following python program. Underline the errors and rewrite the program: import Pandas as pd stud=[‘Name’:”Raghu”,”Class”:11,”House”:”Green”] s=p.Series(s) print(s)
Ans	import pandas as pd stud = {'Name':'Raghu', 'Class':11, 'House':'Green'} s = pd.Series(stud) print(s)
12.	Consider two objects a and b. a is a list whereas b is a Series. Both have values 10,20,25,50. What will be the output of the following two statements considering that the above objects have been created already. a. print(a*2) b. print(b*2) Justify your answer.
Ans	First one will be list replication operation which gives an output as: [10,20,25,50,10,20,25,50] Second one will be vectorised operations on series and will give output as: 0 20 1 40

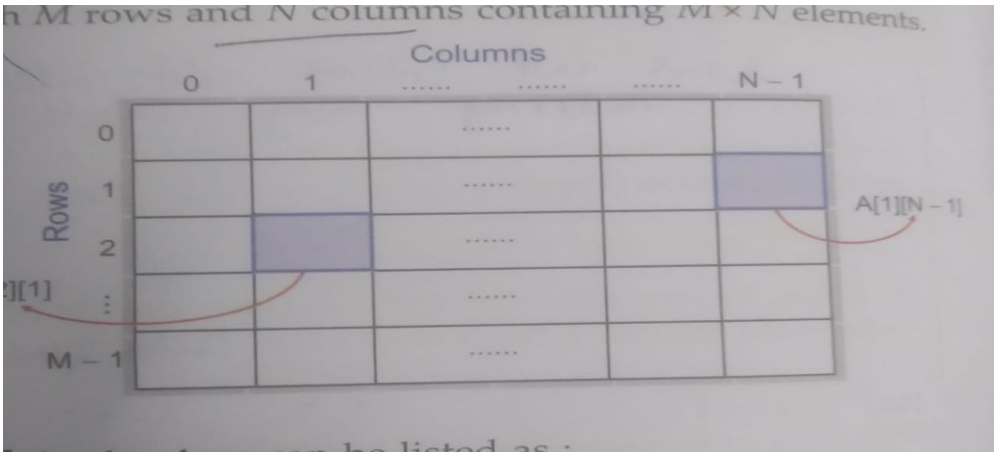
	2 50 3 100
13.	Predict the output: (i) ``` import pandas as pd import numpy as np obj=pd.Series(range(2,10,2)) print(obj) print(obj*2) ``` (ii) ``` import pandas as pd import numpy as np S=pd.Series(10,index=[1,2]) print(S) ```
	1. ``` 0 2 1 4 2 6 3 8 dtype: int64 0 4 1 8 2 12 3 16 dtype: int64 ``` (ii) ``` 1 10 2 10 dtype: int64 ```
14.	Based on the given Series S, answer the following questions: ``` import pandas as pd s1 = pd.Series([10,20,30,40], index =['A','B','C','D']) s2 = pd.Series([2,4,6,8], index =['A','B','C','E']) ``` a) print(s1+s2) b) s4 = s1.reindex(['C','A','D','B']) print(s4) c) print(s1.shape) d) print(s2*3) e) print(s1[0:5:2])
Ans	a. A 12.0 B 24.0 C 36.0 D NaN E NaN dtype: float64 b. C 30 A 10 D 40 B 20 dtype: int64 c. (4,) d. A 6 B 12 C 18 E 24 dtype: int64 e. A 10 C 30 dtype: int64

DataFrame Data Structure

- **Definition:**
  - A dataframe is a 2-D labeled array like Pandas data structure that stores an ordered collection columns that can store data of different types.
  - It can store data in 2-d way . ie it is actually an ordered collection of columns where columns may store different types of data(numeric, string, floating type, Boolean etc)

Before discussing what is a data frame let us understand what is a 2-D array.

A 2-D array is an array in which each element is itself an array. ie an array A[m][n] is an m by n table with m rows and n columns containing mXn elements.



- **Major Characteristics of a DataFrame data structure.**
  1. It has two indexes or two axes- a row index(axis=0) and a column index(axis=1)
  2. The row index is known as index and column index is called column name.
  3. The indexes can be of numbersor letters or strings.
  4. Column can have data of different types.
  5. We can change the value of a DataFrame ie it is value mutable.
  6. We can delete or add rows/columns in a dataframe. ie it is size mutable.

- **Creating and displaying a DataFrame.**

A dataframe object can be created by passing data in 2-D format. Before creation of object
import the necessary modules:
import pandas as pd

The syntax of creation of dataframe object is as follows:

dataframeobject=pandas.DataFrame(2D datastructure,cloumns=column sequence,index=index sequence)

We can create a dataframe object by passing data in many different ways,such as:

1. **Creating a DataFrame Object from a List of Dictionaries**
2. **Creating a DataFrame Object from a 2D Dictionary with values as Series Objects.**

➢ **Creating a DataFrame Object from a List of Dictionaries :**

If you pass a 2D list having dictionaries as its elements (**list of dictionaries**) then it will create a dataframe object **with inner dictionary keys as columns** and **inner dictionary values make rows.**

Eg:

```
import pandas as pd
import numpy as np
model1={'make':'maruti','mileage':20,"price":'5L'}
model2={'make':'hyundai','mileage':18,"price":'10L'}
model3={'make':'tata','mileage':21,"price":'12L'}
cars=[model1,model2,model3]
d=pd.DataFrame(cars)
print(d)
```

OUTPUT

	make	mileage	price
0	maruti	20	5L
1	hyundai	18	10L
2	tata	21	12L

Assignment for you:

Create a DataFrame from a list containing dictionaries of the sales performance of four zonal offices. Zone name should be the row labels.

Hint:

Dictionary keys: Target and Sales.

Zone names: zoneA,zoneB,zoneC,zoneD(These can be name of dictionary objects)

Creating a DataFrame Object from a 2D Dictionary with values as Series Objects.

A Dataframe object can be created by using multiple Series Objects. ie in a 2D dictionary the values can be a series object. Following eg will make it clear for you.

```
import pandas as pd
d1=pd.Series([100,101,102])
d2=pd.Series([70000,85000,72000])
school={"staffid":d1,"salary":d2}
df=pd.DataFrame(school)
```

```
print(df)
```

OUTPUT:

	staffid	salary
0	100	70000
1	101	85000
2	102	72000

Another example:
Consider creating a dataframe from two series objects staff and salaries that store no:of people in various office branches and their salaries in each branch. Dataframe need to be created from the above series objects and from an additional series object which stores average salary per branch.

```
import pandas as pd
staff=pd.Series([10,20,30])
salaries=pd.Series([500000,280000,560000])
avg=salaries/staff
org={'people':staff,'amount':salaries,'average':avg}
df=pd.DataFrame(org)
print(df)
```

OUTPUT:

	people	amount	average
0	10	500000	50000.000000
1	20	280000	14000.000000
2	30	560000	18666.666667

- **Selecting or accessing Data in a DataFrame.**

Desired rows and columns as per requirement can be extracted or selected from a dataframe.

Consider the following Dataframe:

```
import pandas as pd
delhi={'confirmed': 92175,'recovered': 66007,'deceased':2864}
maharashtra={'confirmed': 186626,'recovered':101172,'deceased':8178}
tamilnadu={'confirmed': 98392,'recovered':56021,'deceased':1321}
karnataka={'confirmed': 18016,'recovered':9011,'deceased':272}
covid=[delhi,maharashtra,tamilnadu,karnataka]
df=pd.DataFrame(covid,index=['delhi','maharashtra','tamilnadu','karnataka'])
print(df)
```

OUTPUT:

	confirmed	recovered	deceased
delhi	92175	66007	2864
maharashtra	186626	101172	8178
tamilnadu	98392	56021	1321
karnataka	18016	9011	272

- **Selecting/ Accessing a column:**

  Syntax used is:

  ```
  Dataframeobject [column name]
  ```

  {OR}

  ```
  Dataframeobject.column name
  ```

  From the above example to access the column confirmed use the statement, df['confirmed'] or df.confirmed

  OUTPUT will be:

  ```
  delhi          92175
  maharashtra    186626
  tamilnadu      98392
  karnataka      18016
  Name: confirmed, dtype: int64
  ```

- **Selecting/ Accessing Multiple columns:**

  To select multiple column, give a list having multiple column names inside the square brackets with dataframe object as per following syntax.

  ```
  Dataframeobject [[column name,column name,column name]]
  ```

  Order of display depends on order of selection.
  eg: considering above dataframe object df:
  df[['confirmed','recovered']]
  OUTPUT will be:

	confirmed	recovered
delhi	92175	66007
maharashtra	186626	101172
tamilnadu	98392	56021
karnataka	18016	9011

If its is print(df[['recovered','confirmed']])

```
output is:
           recovered  confirmed
delhi          66007      92175
maharashtra   101172     186626
tamilnadu      56021      98392
karnataka       9011      18016
```

- **Selecting/Accessing a Subset from a DataFrame usingRow/Column Names:**

To access row(s) and or a combination of rows and columns the following syntax can be used to select/access a subset from a dataframe object.

```
Dataframeobject.loc[startrow:endrow,startcolumn:endcolumn]
```

1. **To access a single row:**

syntax is:

```
Dataframeobject.loc[row label,:]
```

eg:
df.loc['karnataka',:]
output will be:

```
confirmed    18016
recovered     9011
deceased       272
Name: karnataka, dtype: int64
```

2. **To access multiple rows:**

Syntax is:

```
Dataframeobject.loc[start row:end row,:]
```

Eg:
df.loc['tamilnadu':'karnataka',:]

Output will be:

```
           confirmed  recovered  deceased
tamilnadu      98392      56021      1321
karnataka      18016       9011       272
```

3. **To access Selective Columns**

Syntax is:

```
Dataframeobject.loc[;,start column: end column]
```

Eg:
print(df.loc[:,'confirmed':'deceased'])
Output will be:

	confirmed	recovered	deceased
delhi	92175	66007	2864
maharashtra	186626	101172	8178
tamilnadu	98392	56021	1321
karnataka	18016	9011	272

If it is:
print(df.loc[:,'confirmed':'recovered'])
Output will be:

	confirmed	recovered
delhi	92175	66007
maharashtra	186626	101172
tamilnadu	98392	56021
karnataka	18016	9011

4. **Combining row and column ranges:**

Dataframeobject.loc[start row:endrow,start column: end column]

Eg: print(df.loc['delhi':'tamilnadu','confirmed':'recovered'])
output will be:

	confirmed	recovered
delhi	92175	66007
maharashtra	186626	101172
tamilnadu	98392	56021

5. Selecting Rows/Columns from a dataframe.[iloc]

Whenever your dataframe object doesn't contain row or column label or if you don't remember them, you can extract the subset from dataframe using row and column numeric index/position using iloc (integer location)

syntax:

Dataframeobject.iloc[start row index:end row index ,start column index :end column index]

- When you use iloc, then start index:end index for given rows and columns works like slices, and the end index is excluded unlike loc.

Eg:
print(df.iloc[0:2,1:3])

Output will be:

	recovered	deceased
delhi	**66007**	**2864**
maharashtra	**101172**	**8178**

Please note that with loc both start label and end label are included while with iloc end index position is excluded.

6. Selecting/Accessing Individual value:

To select/access an individual data value from a dataframe use any one of the following methods:

Dataframeobject.column[row name or row numeric index]

Eg: print(df.recovered['karnataka']) or print(df.recovered[3])

will give output as:

9011

- You can use at or iat attributes with Df object as shown below:

Use	Description
dfobject.at[row label,column label]	Access a single value for a row/column label pair.
dfobject.iat[row index no,col index no]	Access a single value for a row/column pair by integer position.

Eg:

print(df.at['tamilnadu','deceased']) or print(df.iat[2,2])

Output will be:

1321

- **Adding /Modifying Rows/Columns Values in dataframe.**
  - **Adding/Modifying a Column**

Columns in a dataframe can be referred to in multiple ways. Assigning a value to a column

1. Will modify it if the column already exists

2. Will add a new column if it doesn't exist already.

For adding a column the syntax used is:

dfobject.column name=new value
or
dfobject[column]=new value

If the given column name doesn't exists in dataframe then a new column with this name is added.

Eg:df[recoveryrate]=2.5

print(df)

OUTPUT will be:

	confirmed	recovered	deceased	recoveryrate
delhi	**92175**	**66007**	**2864**	**2.5**
maharashtra	**186626**	**101172**	**8178**	**2.5**
tamilnadu	**98392**	**56021**	**1321**	**2.5**
karnataka	**18016**	**9011**	**272**	**2.5**

New column recoveryrate is added and the value 2.5 will be assigned for all the rows.

If you want to assign different values for each row for this newly added column use the following:

df['recoveryrate']=[2.3,2.9,3.5,1.8]

OUTPUT will be:

	confirmed	recovered	deceased	recoveryrate
delhi	**92175**	**66007**	**2864**	**2.3**
maharashtra	**186626**	**101172**	**8178**	**2.9**
tamilnadu	**98392**	**56021**	**1321**	**3.5**
karnataka	**18016**	**9011**	**272**	**1.8**

Using the list of values, each row gets different values.

Note:

For existing column it will change data values and for non-existing column it will add a new column.

Some other ways of adding a column to a dataframe are:

dfobject.at[:,column name]=values for column
or
dfobject.loc[:,columnname]= values for column
or
dfobject=dfobject.assign(column name=values for column)

```
df.at[:,'recoveryrate']=[1,2,3,4]
print(df)
df.loc[:,'recoveryrate']=[5,6,7,8]
print(df)
df=df.assign(expectedcases=[100,50,20,40])
print(df)
```

OUTPUT:

	confirmed	recovered	deceased	recoveryrate
delhi	**92175**	**66007**	**2864**	**1**
maharashtra	**186626**	**101172**	**8178**	**2**
tamilnadu	**98392**	**56021**	**1321**	**3**
karnataka	**18016**	**9011**	**272**	**4**

	confirmed	recovered	deceased	recoveryrate
delhi	**92175**	**66007**	**2864**	**5**
maharashtra	**186626**	**101172**	**8178**	**6**
tamilnadu	**98392**	**56021**	**1321**	**7**
karnataka	**18016**	**9011**	**272**	**8**

	confirmed	recovered	deceased	recoveryrate	expectedcases
delhi	**92175**	**66007**	**2864**	**5**	**100**
maharashtra	**186626**	**101172**	**8178**	**6**	**50**
tamilnadu	**98392**	**56021**	**1321**	**7**	**20**
karnataka	**18016**	**9011**	**272**	**8**	**40**

- **Adding or modifying a row:**

Like columns you can change or add rows to a DataFrame using at or loc attributes as explained below:

Syntax:

dfobject.at[row name,:]=new value
or
dfobject.loc[row name,:]= new value

```
df.at["kerala",:]=7800
print(df)
```

Output will be:

	confirmed	recovered	deceased
delhi	**92175.0**	**66007.0**	**2864.0**
maharashtra	**186626.0**	**101172.0**	**8178.0**
tamilnadu	**98392.0**	**56021.0**	**1321.0**
karnataka	**18016.0**	**9011.0**	**272.0**
kerala	**7800.0**	**7800.0**	**7800.0**

You can observe that the new row kerala has been added in the dataframe but for al values in the newly added row will have same value. If you want separate values in individual columns for the newly added row: use,

df.at["kerala",:]=[5894,3482,27]

print(df)

OUTPUT will be:

	confirmed	recovered	deceased
delhi	**92175.0**	**66007.0**	**2864.0**
maharashtra	**186626.0**	**101172.0**	**8178.0**
tamilnadu	**98392.0**	**56021.0**	**1321.0**
karnataka	**18016.0**	**9011.0**	**272.0**
kerala	**5894.0**	**3482.0**	**27.0**

- **Modifying a Single Cell:**

To change or modify a single data value, use the syntax:

dfobject. column name [row label]=new modified value

eg: df.deceased['delhi']=2952

print(df)

Output will be:

	confirmed	recovered	deceased
delhi	**92175**	**66007**	**2952**
maharashtra	**186626**	**101172**	**8178**
tamilnadu	**98392**	**56021**	**1321**
karnataka	**18016**	**9011**	**272**

- **Deleting/Renaming Columns/Rows.**
  - **Deleting Rows/Columns in a dataframe**
    - **To delete a column use del statement as:**

del dfobject[column name]

- **To delete rows from a dataframe use :**

dfobject.drop(index or sequence of indexes)

Eg:

df.drop(range(2,13,2))

or

df.drop([2,4,6,8,12])

Both the above statements will drop the rows with indexes 2,4,6,8,12 from dataframe df.

Eg:

print(df.drop(['kerala']))

- **Renaming rows/columns**

  To change the name of any row/column individually use the rename() function of dataframe as per the syntax:

dfobject.rename(index={namesdictionary},columns={namesdictionary},inplace=False)

where:

1. index argument is for index names(row labels).(use this if you want to rename rows only)
2. The columns argument is for the column names).(use this if you want to rename columns only)
3. For both index and columns arguments, specify the names-change dictionary containing original names and the new names in a form like [old name:new name]
4. specify inplace argument as **True** if you want to rename the rows/columns in the same dataframe. If you skip this then a new dataframe is created with new indexes/columns names and original remains unchanged.

Eg:

Consider the dataframe df as below:

	rollno	Name	marks
sec a	**115**	**Pavni**	**97.5**
sec b	**236**	**Rishi**	**98.0**
sec c	**307**	**Preet**	**98.5**

To change the rows labels to A,B,C use:

df.rename(index={'seca':'A','secb':'B','secc':'C'})

Here:

- Names of dictionary for index argument is storing the old and new index names
- The output of rename() has shown the changed indexes but these changes are not reflected back in df.
- The rename() function doesn't make changes in original dataframe,. It creates a new dataframe with the changes and original dataframe remains unchanged.
- To make changes in the original dataframe use the argument inplace=True in the rename function.

Eg:

df.rename(index={'seca':'A','secb':'B','secc':'C'},inplace=True)

print(df)

OUTPUT Will be:

	rollno	Name	marks
A	115	Pavni	97.5
B	236	Rishi	98.0
C	307	Preet	98.5

- **Boolean Indexing:**

  Boolean indexing means having Boolean values(True or False) or (1 or 0) as indexes of a dataframe. The Boolean indexes divide the dataframe in two groups. True rows and False rows.

  - **Creating Data frames with Boolean indexs:**

    whenever you create dataframe with Boolean indexes never enclose True and False in single or double quotes.

    Eg:

```
import pandas as pd
Days=['Mon','Tue','Wed','Thur','Fri']
Classes=[3,0,4,0,5]
dc={'Days':Days,'No:of Classes':Classes}
df=pd.DataFrame(dc,index=[True,False,True,False,True])
print(df)
```

    OUTPUT will be:

	Days	No:of Classes
True	Mon	3
False	Tue	0
True	Wed	4
False	Thur	0
True	Fri	5

    In place of True and False 0's and 1's also can be given. as:

```
df=pd.DataFrame(dc,index=[1,0,1,0,1])
```

- **Accessing Rows from Data frames with Boolean Indexes.**

  These indexing are very useful for filtering records ie extracting the True and False rows separately.

  eg:

```
import pandas as pd
Days=['Mon','Tue','Wed','Thur','Fri']
Classes=[3,0,4,0,5]
```

```
dc={'Days':Days,'No:of Classes':Classes}
df=pd.DataFrame(dc,index=[True,False,True,False,True])
print(df)
print(df.loc[True])
print(df.loc[False])
```

OUTPUT:

	Days	No:of Classes
True	Mon	3
False	Tue	0
True	Wed	4
False	Thur	0
True	Fri	5

Days		No:of Classes
True	Mon	3
True	Wed	4
True	Fri	5

	Days	No:of Classes
False	Tue	0
False	Thur	0

- **Iterating over a dataframe.**

Using the below mentioned two methods you can iterate over a dataframe.

1. **dfobject.iterrows()**
2. **dfobject.iteritems()**

df.iterrows() views a dataframe in the form of horizontal subsets. ie row wise and
df.iteritems() views a dataframe in the form of vertical subsets. ie column wise.
Each horizontal subset is in the form of (row-index,Series) where series contains all column values for that row index.
Each vertical subset is in the form of (col-index,Series) where Series contains all row values for that column-index.

1. **Eg iterrows() function:**

```
import pandas as pd
d1={'old price':150,'new price':200,'change':50}
d2={'old price':450,'new price':550,'change':100}
d3={'old price':80,'new price':120,'change':40}
l=[d1,d2,d3]
df=pd.DataFrame(l)
print(df)
```

```
for(row,rowseries) in df.iterrows():
    print("row index:",row)
    print(rowseries)
```

Output will be:

```
old price  new price  change
0       150       200     50
1       450       550    100
2        80       120     40
row index: 0
old price    150
new price    200
change        50
Name: 0, dtype: int64
row index: 1
old price    450
new price    550
change       100
Name: 1, dtype: int64
row index: 2
old price     80
new price    120
change        40
Name: 2, dtype: int64
```

So with iterrows() you can iterate over dataframe row-wise where each rows values are returned in form of a series type object.

2. **Using pandas.iteritems() Function**
   - It gives the vertical subsets from a dataframe in the form of column index and a series object containing values for all rows in that column.

   Eg:

```
#iteritems() function
import pandas as pd
d1={'old price':150,'new price':200,'change':50}
d2={'old price':450,'new price':550,'change':100}
d3={'old price':80,'new price':120,'change':40}
l=[d1,d2,d3]
df=pd.DataFrame(l)
print(df)
for(i,j) in df.iteritems():
    print("column index:",i)
```

```
print(j)
```

Output will be:

```
   old price  new price  change
0        150        200      50
1        450        550     100
2         80        120      40
column index: old price
0    150
1    450
2     80
Name: old price, dtype: int64
column index: new price
0    200
1    550
2    120
Name: new price, dtype: int64
column index: change
0     50
1    100
2     40
Name: change, dtype: int64
```

➢ Head and Tail functions of dataframe:

You can use head() and tail() functions to retrieve top 5 or bottom 5 rows respectively of a dataframe object if you pass no argument to this. These functions are to be used as:

```
df.head()
df.tail()
```

Eg:

```
import pandas as pd
d1={'rollno':115,'Name':'Pavni','marks':97.5}
d2={'rollno':236,'Name':'Rishi','marks':98}
d3={'rollno':307,'Name':'Preet','marks':98.5}
d4={'rollno':317,'Name':'rahul','marks':98.5}
d5={'rollno':327,'Name':'abhay','marks':98.5}
d6={'rollno':347,'Name':'amit','marks':98.5}
d7={'rollno':407,'Name':'avi','marks':98}
d8={'rollno':507,'Name':'abhi','marks':98}
```

```
d9={'rollno':607,'Name':'aakash','marks':97}
d10={'rollno':817,'Name':'nandu','marks':99}
l=[d1,d2,d3,d4,d5,d6,d7,d8,d9,d10]
df=pd.DataFrame(l)
print(df.head())
print(df.tail())
print(df)
```

OUTPUT

	rollno	Name	marks
0	115	Pavni	97.5
1	236	Rishi	98.0
2	307	Preet	98.5
3	317	rahul	98.5
4	327	abhay	98.5

	rollno	Name	marks
5	347	amit	98.5
6	407	avi	98.0
7	507	abhi	98.0
8	607	aakash	97.0
9	817	nandu	99.0

	rollno	Name	marks
0	115	Pavni	97.5
1	236	Rishi	98.0
2	307	Preet	98.5
3	317	rahul	98.5
4	327	abhay	98.5
5	347	amit	98.5
6	407	avi	98.0
7	507	abhi	98.0
8	607	aakash	97.0
9	817	nandu	99.0

You can retrieve any no of top or bottom rows with head() and tail() functions by specifying the required parameter in the function.

Eg:

```
import pandas as pd
d1={'rollno':115,'Name':'Pavni','marks':97.5}
```

```
d2={'rollno':236,'Name':'Rishi','marks':98}
d3={'rollno':307,'Name':'Preet','marks':98.5}
d4={'rollno':317,'Name':'rahul','marks':98.5}
d5={'rollno':327,'Name':'abhay','marks':98.5}
d6={'rollno':347,'Name':'amit','marks':98.5}
d7={'rollno':407,'Name':'avi','marks':98}
d8={'rollno':507,'Name':'abhi','marks':98}
d9={'rollno':607,'Name':'aakash','marks':97}
d10={'rollno':817,'Name':'nandu','marks':99}
l=[d1,d2,d3,d4,d5,d6,d7,d8,d9,d10]
df=pd.DataFrame(l)
print(df.head(3))
print(df.tail(2))
```

OUTPUT will be:

	rollno	Name	marks
0	115	Pavni	97.5
1	236	Rishi	98.0
2	307	Preet	98.5
	rollno	Name	marks
8	607	aakash	97.0
9	817	nandu	99.0

CREATING DATAFRAME FROM CSV FILE

- **CSV FILE**

A CSV is a comma separated values file, which allows data to be saved in a tabular format. CSV is a simple file such as a spreadsheet or database. Files in the csv format can be imported and exported from programs that store data in tables, such as Microsoft excel or Open Office.

CSV files data fields are most often separated, or delimited by a comma. Here the data in each row are delimited by comma and individual rows are separated by newline.

- **How to Create a CSV File**

To create a csv file, first choose your favorite text editor such as- Notepad and open a new file.Then enter the text data you want the file to contain, separating each value with a comma and each row with a new line. Save the file with the extension.csv. You can open

the file using MS Excel or another spread sheet program. It will create the table of similar data.

- **Creating a DataFrame from a CSV File:**

Function read_csv() defined in pandas module is used to read a csv file. Syntax of the function is:

pandas.read_csv()

Following program illustrate how to create a dataframe from a csv file:

```
import pandas as pd
df=pd.read_csv("E:\mypythonfiles\emp.csv")
print(df)
```

OUTPUT will be:

	empid	empname	dept
0	101	rahul	finance
1	102	amal	hr
2	103	abhay	marketing

Try this:

Create a csv file stu.csv file and create a dataframe from this.

The content of csv file must be stuid,stuname,class and marks.

- **Exporting data from dataframe to CSV File**

Method **dataframeobject.to_csv()** is used to export dataframe to a csv file.

ie,To export a data frame into a csv file first of all, we create a data frame say df and use df.to_csv(‘ E:\Dataframe1.csv ’) method to export data frame df into csv file Dataframe1.csv.

Following program will explain the same:

```
import pandas as pd
d1={'firstname':'sachin','lastname':'tendulkar'}
d2={'firstname':'rohit','lastname':'sharma'}
d3={'firstname':'virat','lastname':'kohli'}
l=[d1,d2,d3]
df=pd.DataFrame(l)
df.to_csv("E:\\fullname.csv")
```

This will create a csv file fullname.csv in the specified folder with the content of dataframe df.

****

BOARD BASED QUESTIONS ON SERIES AND DATA FRAMES.

1.	Which of the following command will not show first five rows from the Pandas series named Sl ? (i)Sl[0:5] (ii) Sl.head() (iii) Sl.head(5) (iv) Sl.head[0:5]
Ans	S1.head[0:5]
2.	The Python code written below has syntactical errors. Rewrite the correct code and underline the correction(s) made: import Pandas as pd stud=['Name':'Ramya','Class':11,'House':'Red'] s=p.Series(s) print(s)
Ans	import pandas as pd stud = {'Name':'Ramya', 'Class':11, 'House':'Red'} s = pd.Series(stud) print(s)
3.	Find the output of the following Python code : import pandas as pd com=pd.Series([45,12,15,200],index=['mouse','printer', 'webcam','keyboard']) print(com[l:3])
Ans	printer 12 webcam 15 dtype: int64

4.	Consider the following Python code :
	`import pandas as pd`
	`Sl=pd.Series(['Rubina','Jaya','Vaibhav'],index=[10,16,18])`
	`S2=pd.Series(_____, index=[10,16,18])`
	`S3=pd.Series([56,67,86], _____ )`
	`xiia={'Name':_____,'Subject':S2,'Marks':S3}`
	`df=pd.DataFrame(_____)`
	`print(df)`
	Complete the above Python code to display the following output :
	`Name Subject Marks`
	`10 Rubina IP 56`
	`16 Jaya HSc 67`
	`18 Vaibhav IP 86`

Ans	import pandas as pd S1=pd.Series(['Rubina','Jaya','Vaibhav'], index=[10,16,18]) S2=pd.Series(['IP','HSc','IP'], index=[10,16,18]) S3=pd.Series([56,67,86], index=[10,16,18]) xiia={'Name':S1, 'Subject':S2, 'Marks':S3}

	df=pd.DataFrame(xiia) print(df)

5.	Consider the given DataFrame 'password':
	
	`CodeName Category Frequency`
	`0 aaaaaa alpha 6.91`
	`1 dragon animal 18.52`
	`2 baseball sport 1.29`
	`3 football sport 11.11`
	`4 monkey animal 3.72`
	`5 qwerty alpha 1.85`
	`6 abcde alpha 3.19`
	
	Write suitable Python statements for the following :
	
	1. To add a new row with following values :
	CodeName - 'abc123' Category - alphanumeric Frequency - 12.8
	2. To delete the row with the row label 2.
	3. To delete the column having column label as Frequency

Ans	1. password.loc[7]=['abc123','alphanumeric',12.8] OR password.at[7]=['abc123','alphanumeric',12.8] 2. password.drop(2, inplace=True) OR password.drop(2, inplace=True, axis=0) 3. password.drop("Frequency", axis=1, inplace=True) OR password.drop(columns=['Frequency'], inplace=True)

6.	Ms. Ritika conducted an online assessment and stored the details in a DataFrame **result** as given below :
	
	`Name Score Attempts Qualify`
	`a Atulya 12.5 1 yes`
	`b Disha 9.0 3 no`
	`c Kavita 16.5 2 yes`
	`d John 15.0 1 no`
	Answer the following questions :
	
	1. Predict the output of the following Python statement:
	print(result.loc [:,'Attempts'] > 1)
	2. Write the Python statement to display the last three records.
	3. Write Python statement to display records of 'a ' and 'd' row labels.
	4. Write suitable Python statement to retrieve the data stored in the file, 'registration.csv' into a DataFrame, 'regis'.

Ans	1. a False b True c True d False Name: Attempts, dtype: bool 2. print(result.tail(3)) OR print(result.iloc[1:]) 3. print(result.loc[["a","d"]]) OR print(result.iloc[[0,3],:]) 4. regis=pd.read_csv("registration.csv")

SOME MORE QUESTIONS BASED ON SERIES AND DATAFRAME

S.No	QUESTION
1	Which of the following command will show the last 3 rows from a Pandas Series named NP? i. NP.Tail( ) ii. NP.tail(3) iii. NP.TAIL(3) iv. All of the above
Ans	ii. NP.tail(3) (1 mark for correct answer)
2	In Python Pandas, while performing mathematical operations on series, index matching is implemented and all missing values are filled in with _____by default. i. Null ii. Blank iii. NaN iv. Zero
Ans	iii. NaN (1 mark for correct answer)
3	Pandas Series is: a. 2 Dimensional b. 3 Dimensional c. 1 Dimensional d. Multidimensional
Ans	c. 1 Dimensional
4	We can analyse the data in pandas with a. Series b. Data Frame c. Both of the above d. None of the above
Ans	C. Both of the above
5	Assertion (A):- To use the Pandas library in a Python program, one must import it. Reasoning (R): - The only alias name that can be used with the Pandas library is pd. 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
Ans	iii. A is True but R is False (1 mark for correct answer)
6	To display last five rows of a series object ‘S’, you may write: i. S.Head() ii. S.Tail(5) iii. S.Head(5) iv. S.tail()
Ans	iv. S.tail() 1 mark for correct answer
7	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
Ans	iv. All of these

8	Which of the following statement will import pandas library? i. Import pandas as pd ii. import Pandas as py iii. import pandas as pd iv. import panda as pd
Ans	iii. import pandas as pd
9	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 Assertion (A):- DataFrame has both a row and column index. Reasoning (R): - A DataFrame is a two-dimensional labelled data structure like a table of MySQL.
Ans	i. Both A and R are true and R is the correct explanation for A
10	What will be the output of the following code: >>>import pandas as pd >>>A=pd.Series(data=[35,45,55,40]) >>>print(A>45)
Ans	0 False 1 False 2 True 3 False
11	The python code written below has syntactical errors. Rewrite the correct code and underline the corrections made. Import pandas as pd df ={"Technology":["Programming","Robotics","3D Printing"],"Time(in months)":[4,4,3]} df= Pd.dataframe(df) Print(df)
Ans	import pandas as pd df ={"Technology":["Programming","Robotics","3D Printing"],"Time(in months)":[4,4,3]} df= pd.DataFrame(df) print(df)
12	Predict the output of the given Python code: import pandas as pd list1=[-10,-20,-30] ser = pd.Series(list1*2) print(ser)
Ans	0 -10 1 -20 2 -30 3 -10 4 -20 5 -30

13	Complete the given Python code to get the required output as: Rajasthan import _____ as pd di = {'Corbett': 'Uttarakhand', 'Sariska': 'Rajasthan', 'Kanha': 'Madhya Pradesh', 'Gir':'Gujarat'} NP = _____. Series(_____) print(NP[_____])
Ans	import pandas as pd di = {'Corbett': 'Uttarakhand', 'Sariska':'Rajasthan', 'Kanha': 'Madhya Pradesh','Gir':'Gujarat'} NP = pd.Series(di) print(NP['Sariska'])
14	Carefully observe the following code: import pandas as pd Year1={'Q1':5000,'Q2':8000,'Q3':12000,'Q4': 18000} Year2={ 'Q1':8000,'Q2':6000,'Q3':14000,'Q4': 25000} totSales=[Year1,Year2] df=pd.DataFrame(totSales,index=["r1","r2"]) print(df) Answer the following: i. List the index of the DataFrame df ii. List the column names of DataFrame df.
Ans	i. The index labels of df will include r1,r2 ii. The column names of df will be: Q1,Q2,Q3,Q4
15	Write a Python code to create a DataFrame with appropriate column headings from a list of dictionaries given below: d1={'rno':101, 'Name':'Gurman', 'Marks':98} d2={'rno' :102, 'Name':'Rajveer', 'Marks' :95} d3={'rno' :103, 'Name':'Samar' , 'Marks' :96} d4={'rno ':104, 'Name':'Yuvraj', 'Marks' :88}
Ans	import pandas as pd d1={'rno':101, 'Name':'Gurman', 'Marks':98} d2={'rno' :102, 'Name':'Rajveer', 'Marks' :95} d3={'rno' :103, 'Name':'Samar' , 'Marks' :96} d4={'rno ':104, 'Name':'Yuvraj', 'Marks' :88} student=[d1,d2,d3,d4] df=pd.DataFrame(student) print(df)
16	Based on the given DataFrame df answer the following questions:

	rollno	name	marks
A	1001	Karuna	85
B	1002	Sumit	80
C	1003	Ruma	90
D	1004	Pronoy	80
E	1005	Akshay	65

a) Write a python statement to delete the first row in the DataFrame.
b) Write a python statement to insert a new column between name and marks as Grade with Data B, B, A, B, C
c) Write a python statement to make the marks of row with index C to 100.

Ans

a) df1.drop(index='A', inplace=True) or df1.drop('A', axis=0, inplace=True)
b) df1.insert(2,'Grade',['B','B','A','B','C'])
c) df1.loc['C','marks']=100 or df1.iloc[2:3,3:]=100

17

Consider the given DataFrame 'Genre':

	Type	Code
0	Fiction	F
1	Non Fiction	NF
2	Drama	D
3	Poetry	P

Write suitable Python statements for the following:
i. Add a column called Num_Copies with the following data:
[300,290,450,760].
ii. Add a new genre of type 'Folk Tale' having code as "FT" and 600 number of copies.
iii. Rename the column 'Code' to 'Book_Code'.

Ans

i. Genre["Num_Copies"]=[300,290,450,760]
ii. Genre.loc[4]=["Folk Tale","FT",600]
iii.Genre=Genre.rename({"Code":"Book_Code"}, axis=1)
OR
Genre=Genre.rename({"Code":"Book_Code"}, axis="columns")

18

Consider the given DataFrame 'Stock':

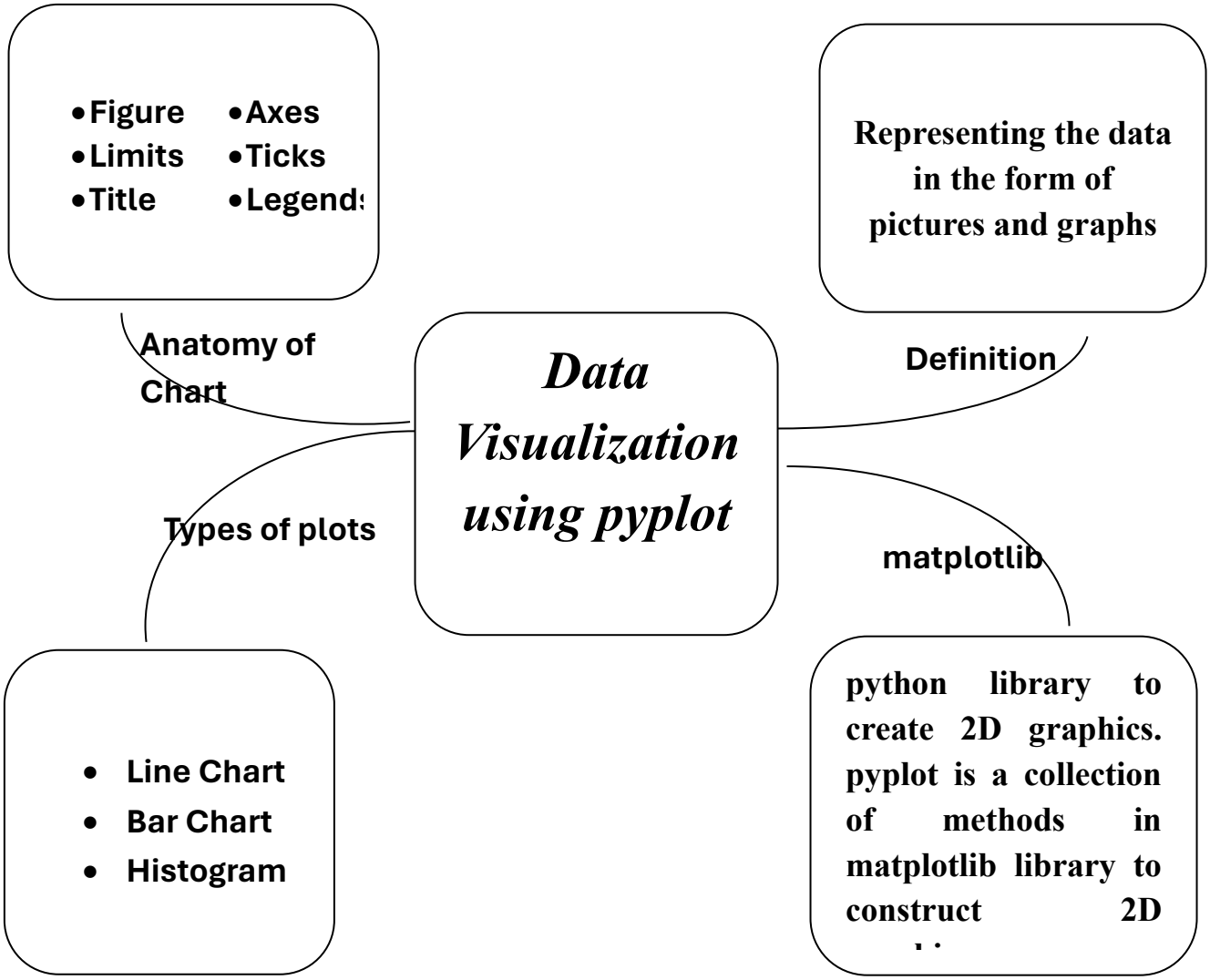
	Name	Price
0	Nancy Drew	150
1	Hardy boys	180
2	Diary of a wimpy kid	225
3	Harry Potter	500

	Write suitable Python statements for the following: i. Add a column called Special_Price with the following data: [135,150,200,440]. ii. Add a new book named 'The Secret' having price 800. iii. Remove the column Special_Price.
Ans	i. Stock['Special_Price']=[135,150,200,400] ii. Stock.loc['4']=['The Secret',800] iii. Stock=Stock.drop('Special_Price',axis=1)
19	Mr.Anil Kumar, 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: 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.
Ans	A. Output: i. (5,4) 1+1+2 ii. School tot_students Topper First_Runner_up CO3 GPS 20 18 2 CO4 MPS 18 10 8 B. Python statement: print(df.loc['CO2': 'CO4', 'Topper'])
20	Mr. Sudhir , a Data Analyst with a multinational brand has designed the DataFrame df that contains the four quarter's sales data of different stores as shown below: Store Qtr1 Qtr2 Qtr3 Qtr4 0 Store1 300 240 450 230 1 Store2 350 340 403 210 2 Store3 250 180 145 160 Answer the following questions: i. Predict the output of the following python statement: a. print(df.size) b. print(df[1:3]) ii. Delete the last row from the DataFrame. iii. Write Python statement to add a new column Total_Sales which is the

	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

	addition of all the 4 quarter sales.
Ans	i. a. 15 b. Store Qtr1 Qtr2 Qtr3 Qtr4 1 Store2 350 340 403 210 2 Store3 250 180 145 160 ii. df=df.drop(2) OR df.drop(2,axis=0) iii. df["total"]=df["Qtr1"]+df["Qtr2"]+df["Qtr3"]+df["Qtr 4"]

DATA VISUALIZATION



Representing the data in the form of pictures and graphs is called data visualization. It represents trends, patterns etc. for making decisions in business.

matplotlib is a python library to create 2D graphics

pyplot is a collection of methods in matplotlib library to construct 2D graphics. Various methods of pyplot are as follows:

Method	Description	Syntax	Remarks
plot()	To plot the line and scatter chart	matplotlib.pyplot.plot(x,y,'colorname',linewidth=width,linestyle='style',marker='marker',markersize=size,markeredgecolor='color',label='label')	parameters x and y are necessary, others are optional i.e can be skipped. label parameter is used in multichart
bar()	To plot the vertical bar chart	matplotlib.pyplot.bar(x,y,width=width,color=color)	parameters x and y are necessary, others are optional i.e can be skipped. label parameter is used in multichart We can pass list of values for width and color both.
barh()	To plot the horizontal bar chart	matplotlib.pyplot.barh(y,x,width=width,color=color)	parameters x and y are necessary, others are optional i.e can be skipped. label parameter is used in multichart
show()	To display the chart	matplotlib.pyplot.show()	
xlabel()	To set the label for x axis	matplotlib.pyplot.xlabel(label)	
ylabel()	To set the label for y axis	matplotlib.pyplot.ylabel('label')	
title()	To set the title of the chart	matplotlib.pyplot.title('title')	
legend()	To place the legend on axes corresponding to the label parameter passed to plot() or bar() or barh() method.	matplotlib.pyplot.legend(loc='location')	A legend is an area describing the elements of the graph.
xlim()	To get or set the x-limits of the current axes	matplotlib.pyplot.xlim(lowervalue,uppervalue)	
ylim()	To get or set the y-limits of the current axes	matplotlib.pyplot.ylim(lowervalue,uppervalue)	
xticks()	To get and set the current tick locations and labels of the x-axis.	matplotlib.pyplot.xticks(ticks=[list of ticks])	
yticks()	to get and set the current tick locations and labels of the y-axis.	matplotlib.pyplot.yticks(ticks=[list of ticks])	

savefig()	To save the current figure	matplotlib.pyplot.savefig('filename with path')	If path is skipped, figure is saved in the current working directory
hist()	To plot a histogram	matplotlib.pyplot.hist(x, bins=bins, cumulative=False/True, histtype='type of hist', align='align', orientation='orientation', color='color', label='label', stacked=False/True)	parameters x and bins are necessary, others are optional i.e can be skipped. set the value of cumulative parameter as True to create cumulative histograms. lly, set the value of stacked parameter to True to create stacked histogram. By default their values are False.

Marker styles in Matplotlib

All possible markers are defined here:

marker	symbol	description
"."		point
","		pixel
"o"		circle
"v"		triangle_down
"^"		triangle_up
"<"		triangle_left
">"		triangle_right
"1"		tri_down
"2"		tri_up
"3"		tri_left
"4"		tri_right
"8"		octagon
"s"		square
"p"		pentagon
"P"		plus (filled)
"*"		star
"h"		hexagon1
"H"		hexagon2
"+"		plus
"x"		x
"X"		x (filled)
"D"		diamond

marker	symbol	description
"d"		thin_diamond
"|"		vline
"_"		hline

Line Styles in Matplotlib

Below are the available line styles present in Matplotlib.

Character	Definition
–	Solid line
—	Dashed line
-.	dash-dot line
:	Dotted line
.	Point marker
o	Circle marker
,	Pixel marker
v	triangle_down marker
^	triangle_up marker
<	triangle_left marker
>	triangle_right marker
1	tri_down marker
2	tri_up marker
3	tri_left marker

Character	Definition
4	tri_right marker
s	square marker
p	pentagon marker
*	star marker
h	hexagon1 marker
H	hexagon2 marker
+	Plus marker
x	X marker
D	Diamond marker
d	thin_diamond marker
|	vline marker
_	hline marker

Color code abbreviations that can be used along with the line styles or marker styles are:

Codes	Description
b	blue
g	green
r	red
c	cyan

Codes	Description
m	magenta
y	yellow
k	black
w	white

BASICS OF PLOTTING

Types of charts in python to visualize the data elements are :

1. Line chart – It displays the information as a series of data points connected by straight line
2. Bar chart – It displays category wise data in rectangular bars. It can be horizontal or vertical.

Note : To plot any type of chart , matplotlib.pyplot library needs to be imported

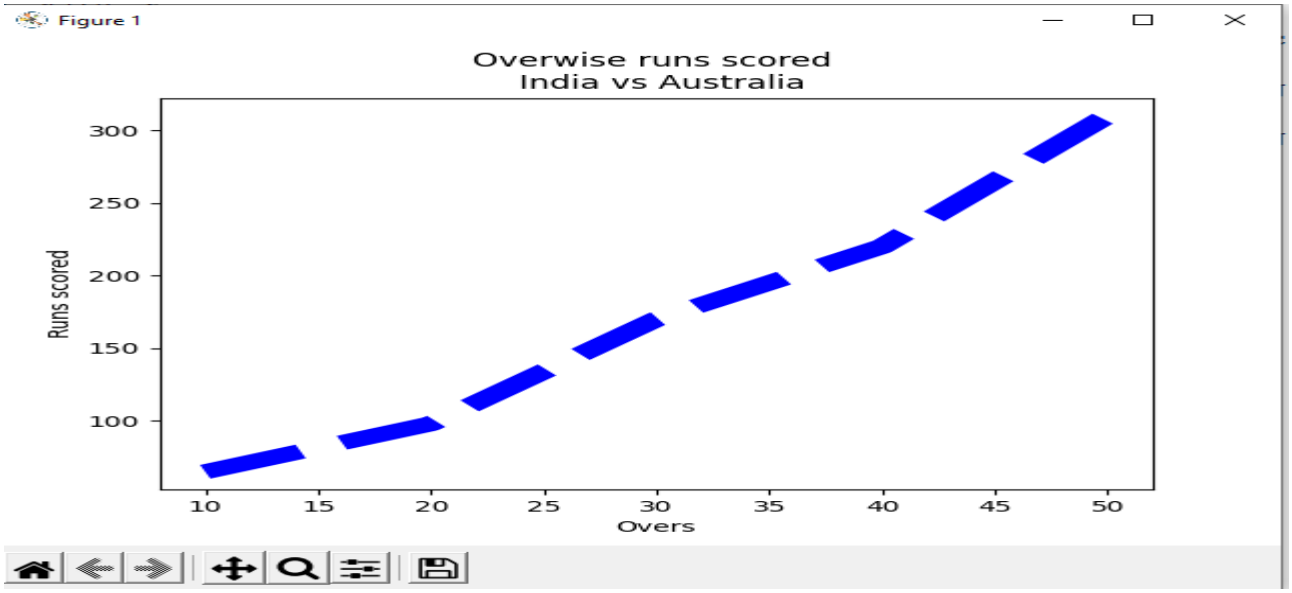
- **Plotting Line chart**

plot() function is used to plot the line chart.

Examples

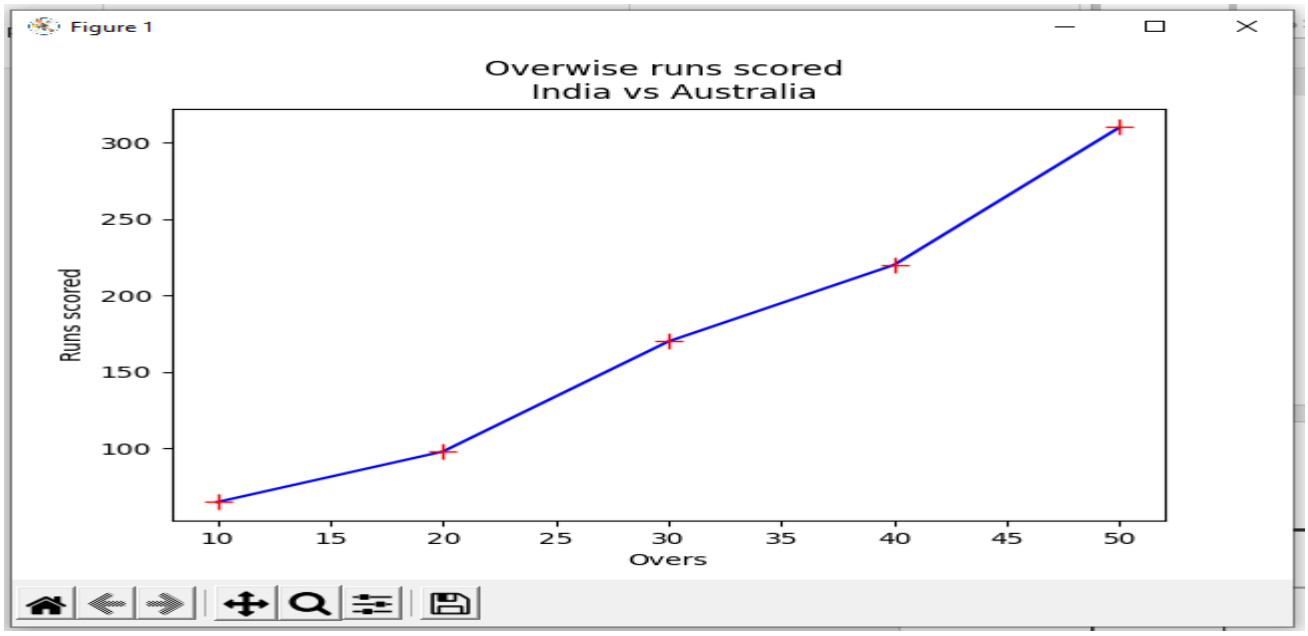
Ex - 1

```
import matplotlib.pyplot as plt
x=[10,20,30,40,50]
y=[65,98,170,220,310]
plt.plot(x,y,'b',linestyle='dashed',linewidth=10)
plt.xlabel('Overs')
plt.ylabel('Runs scored')
plt.title('Overwise runs scored \n India vs Australia')
plt.show()
```



Ex-2

```
import matplotlib.pyplot as plt
x=[10,20,30,40,50]
y=[65,98,170,220,310]
plt.plot(x,y,'b',markeredgecolor='r',marker='+')
plt.show()
```



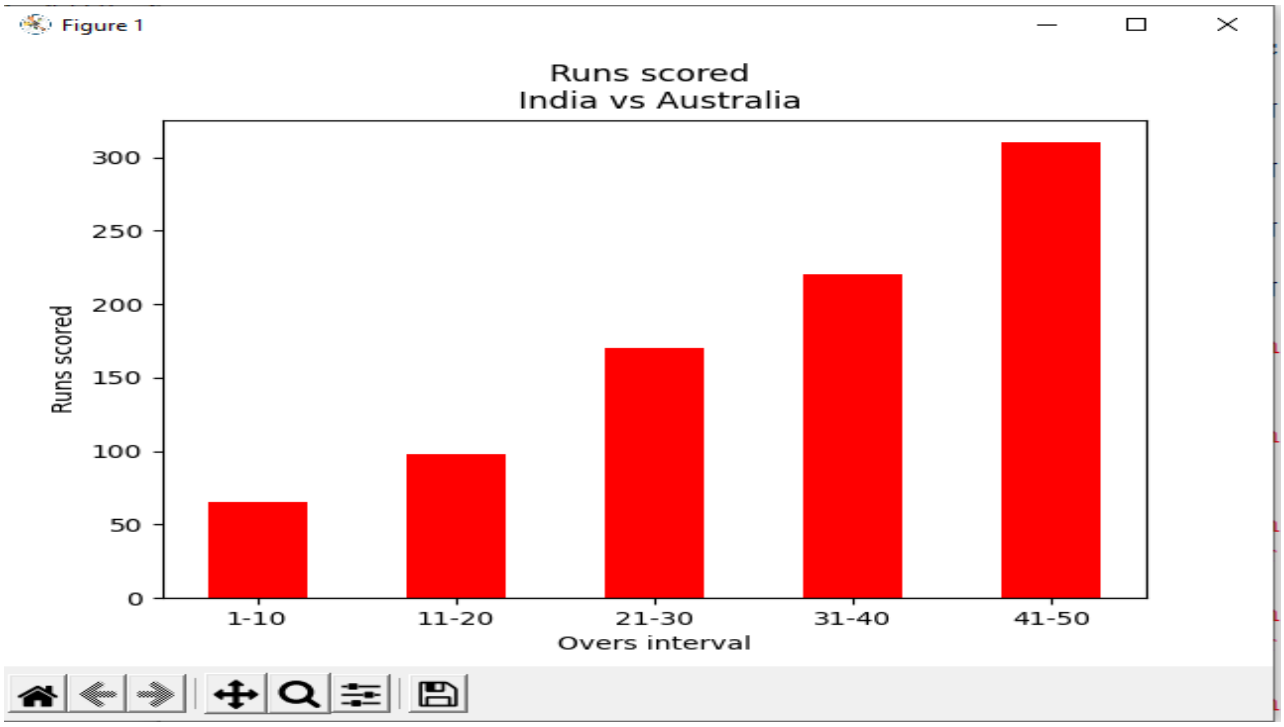
- **Plotting bar chart**

bar() function is used to plot the bar chart

Examples

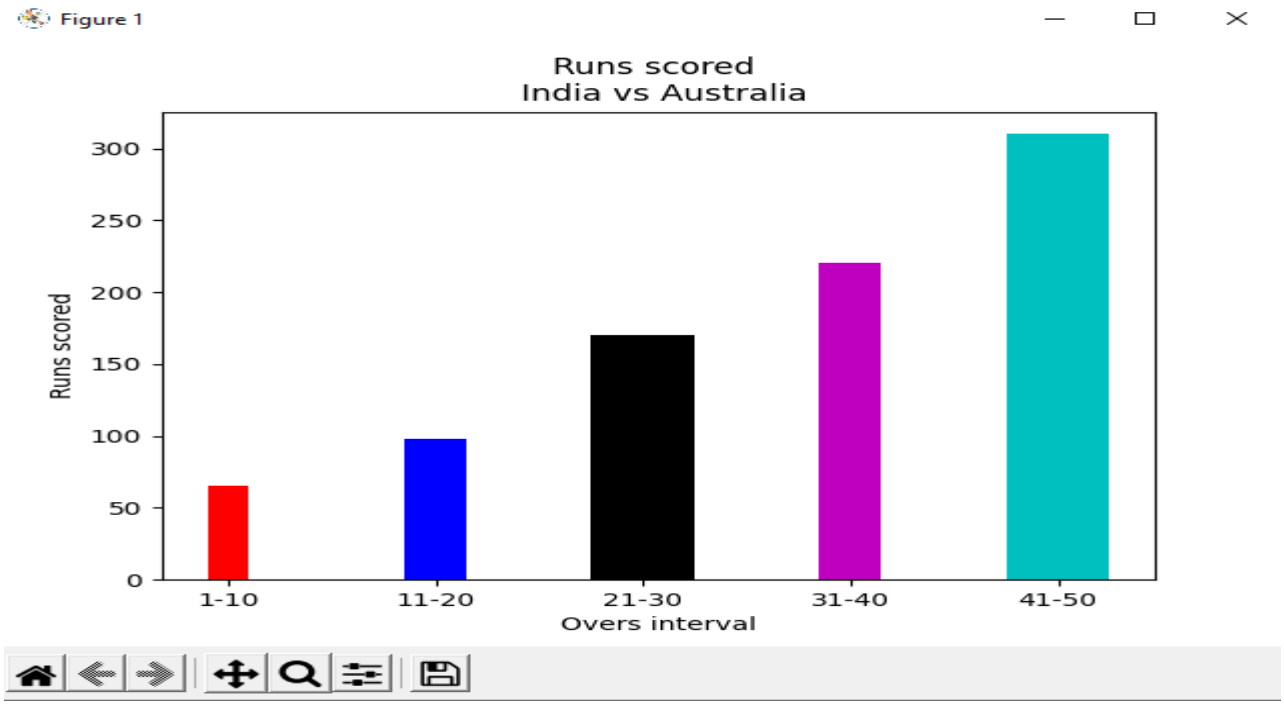
Ex-1

```
import matplotlib.pyplot as plt
oversrange=['1-10','11-20','21-30','31-40','41-50']
y=[65,98,170,220,310]
plt.bar(oversrange,y,width=0.5,color='r')
plt.xlabel('Overs interval')
plt.ylabel('Runs scored')
plt.title('Runs scored \n India vs Australia')
plt.show()
```



Ex-2

```
import matplotlib.pyplot as plt
oversrange=['1-10','11-20','21-30','31-40','41-50']
y=[65,98,170,220,310]
plt.bar(oversrange,y,width=[0.2,0.3,0.5,0.3,0.5],color=['r','b','k','m','c'])
plt.xlabel('Overs interval')
plt.ylabel('Runs scored')
plt.title('Runs scored \n India vs Australia')
plt.show()
```



- **Plotting horizontal bar chart**

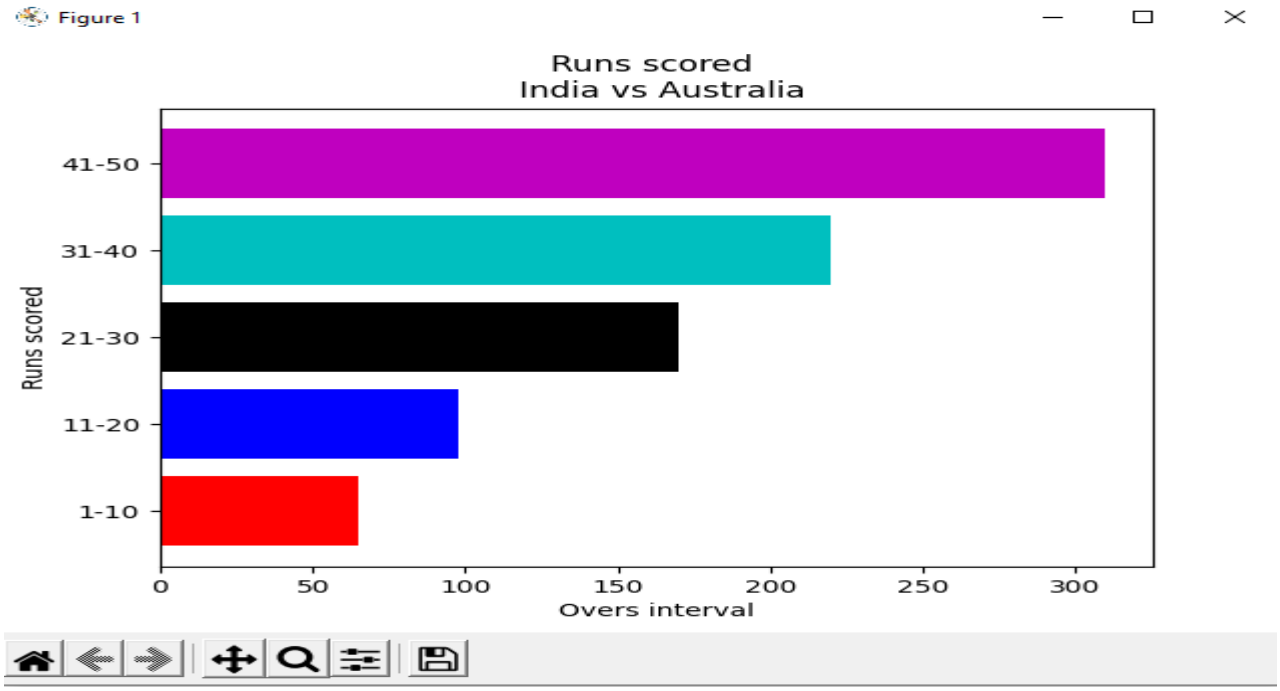
barh() function is used to plot horizontal bar chart.

Note: x and y coordinates are interchanged in horizontal bar chart .width parameter is not applicable in barh()

Examples

```
import matplotlib.pyplot as plt
oversrange=['1-10','11-20','21-30','31-40','41-50']
```

```
y=[65,98,170,220,310]
plt.barh(oversrange,y,color=['r','b','k','c','m'])
plt.xlabel('Overs interval')
plt.ylabel('Runs scored')
plt.title('Runs scored \n India vs Australia')
plt.show()
plt.savefig("figure.jpeg")
```



- **Plotting multiple charts**

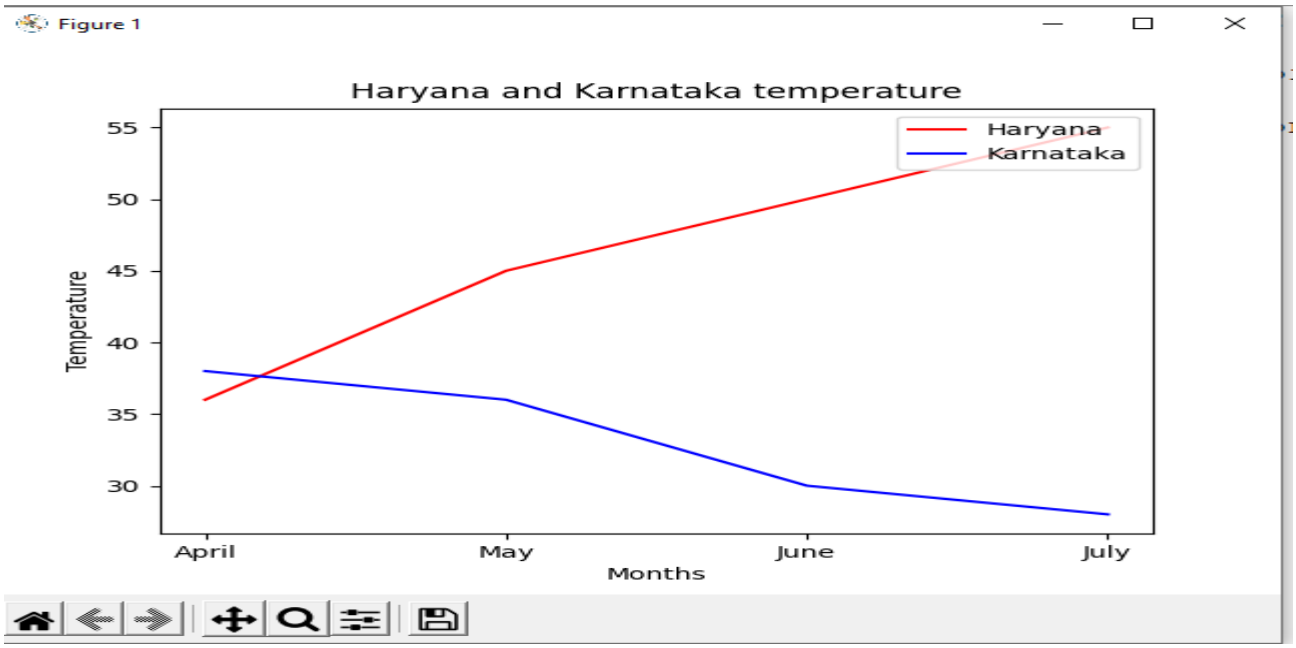
We can plot multiple charts (line or bar) in a single graph area.

Multiple line charts :

Example

```
import matplotlib.pyplot as plt
Months=['April','May','June','July']
temp_har=[36,45,50,55]
temp_Kar=[38,36,30,28]
```

```
plt.plot(Months,temp_har,'r',label='Haryana')
plt.plot(Months,temp_Kar,'b',label='Karnataka')
plt.legend(loc='upper right')
plt.xlabel('Months')
plt.ylabel('Temperature')
plt.title('Haryana and Karnataka temperature')
plt.show()
```



Multiple bar charts:

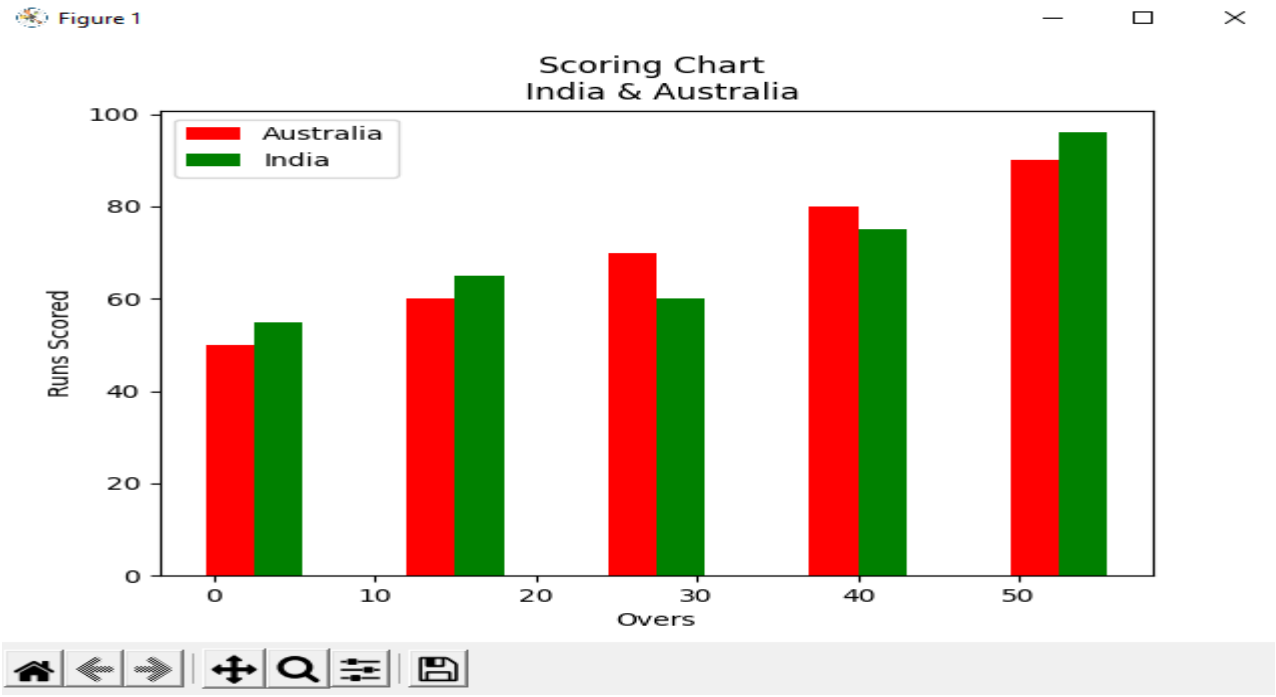
To draw multiple bar charts remember the following points:

1. Decide the no. of X points, we can use arrange() or linspace() function to find the no. of points based on the length of values in sequence.
2. Decide the thickness of each bar and adjust X points on x axis accordingly.
3. Give different color to different data ranges
4. The width remains the same for all data ranges being plotted.
5. Call plot for each data range.

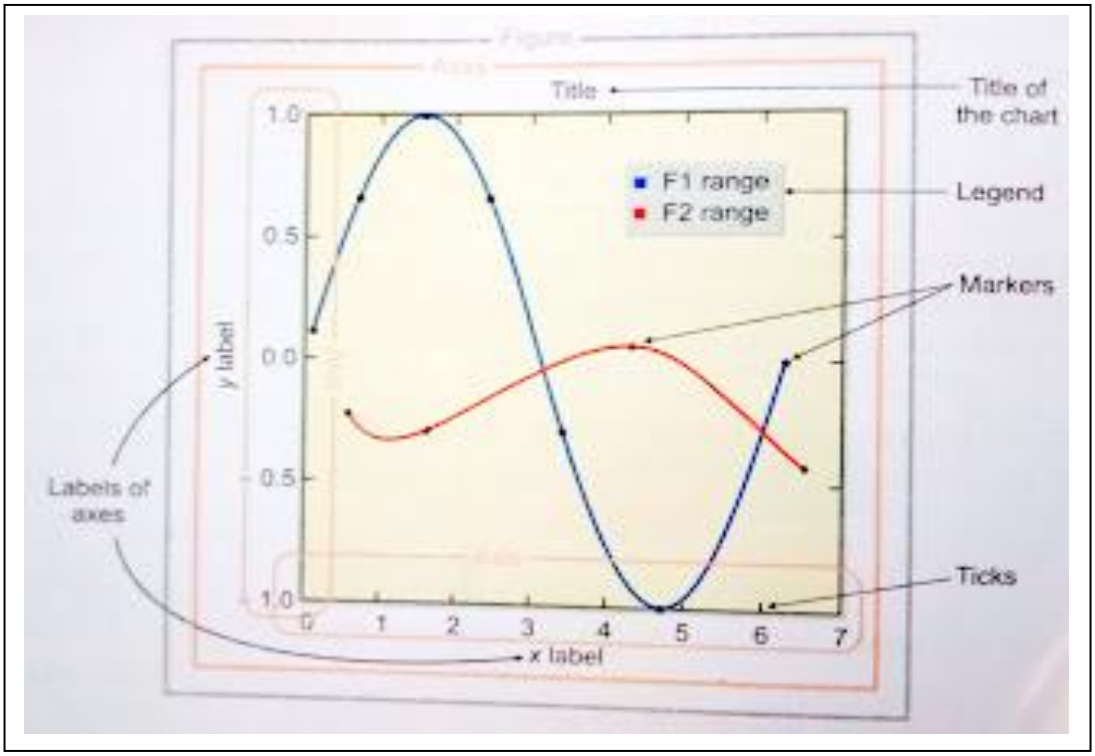
Example

```
import matplotlib.pyplot as plt
import numpy as np
```

```
a=[50,60,70,80,90]
b=[55,65,60,75,96]
x=np.linspace(1,51,5)
plt.bar(x,a,width=3,color='r',label='Australia')
plt.bar(x+3,b,width=3,color='g',label='India')
plt.xlabel('Overs')
plt.ylabel('Runs Scored')
plt.title('Scoring Chart \n India & Australia')
plt.legend()
plt.show()
```



➢ Anatomy of the chart



Various parts of a Chart are as :-

•Figure: - PyPlot by default plots every chart into an area called Figure. A figure contains other elements of the plot in it.

• Axes: - The axes define the area (mostly rectangular in shape for simple plots) on which actual plot (line or bar or graph etc.) will appear. Axes have properties like label, limits and tick marks on them.

There are two axes in a plot: (i) X-axis, the horizontal axis, (ii) Y-axis, the vertical axis.

Axis label: It defines the name for an axis. It is individually defined tor X-axis and Y-axis each.xlabel() and ylabel() methods are used to give labels on axes.

Limits: These define the range of values and number of values marked on X-axis and Y-axis.xlim() and ylim() methods are used for this purpose.

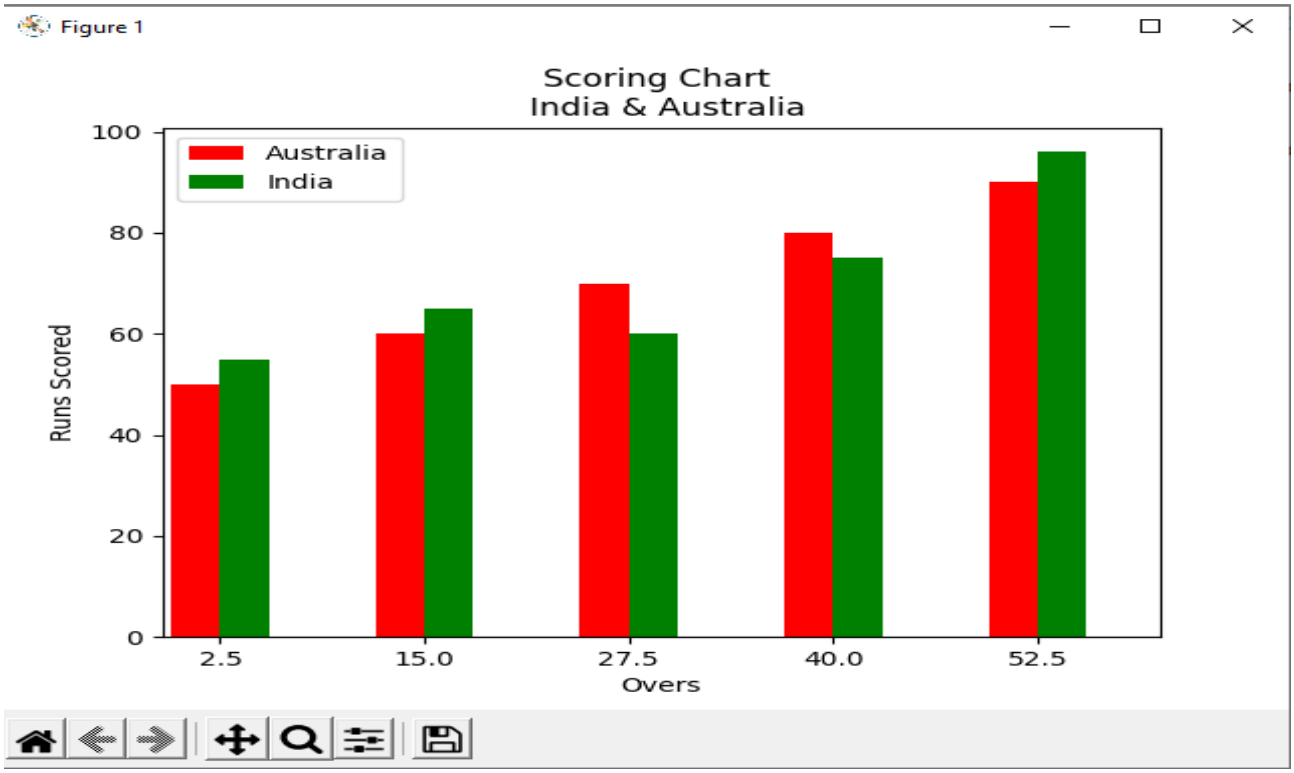
Tick_Marks. The tick marks are individual points marked on the X-axis or Y-axis.xticks() and yticks() methods are used to mark the ticks on the axes.

• Title: - This is the text that appears on the top of the plot. It defines what the chart is about.

• Legends: - These are the different colors that identify different sets of data plotted on the plot. The legends are shown in a corner of the plot.

Example

```
import matplotlib.pyplot as plt
import numpy as np
a=[50,60,70,80,90]
b=[55,65,60,75,96]
x=np.linspace(1,51,5)
plt.bar(x,a,width=3,color='r',label='Australia')
plt.bar(x+3,b,width=3,color='g',label='India')
plt.xticks(x+1.5)
plt.xlim(-1,60)
plt.xlabel('Overs')
plt.ylabel('Runs Scored')
plt.title('Scoring Chart \n India & Australia')
plt.legend()
plt.show()
```



- **Histogram**

Histogram shows distribution of values. Histogram is similar to bar graph but it is useful to show values grouped in bins or intervals.

hist() method is used to plot histogram.

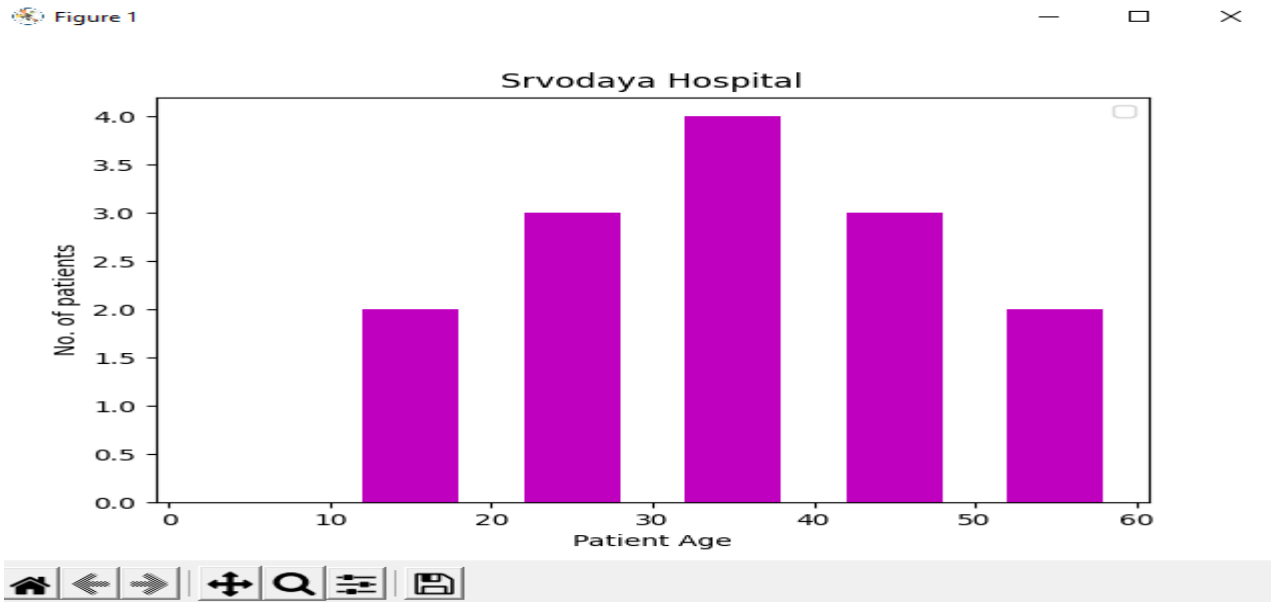
For example – we can collect the age of each patient in hospital and show it in the form of a histogram to know how many patients are there in the range 0-10 years, 10-20 years and so on. Code to create histogram for this problem is a s:

Example

```
import matplotlib.pyplot as plt

age=[22,32,35,45,55,14,26,19,56,44,48,33,38,28]

years=[0,10,20,30,40,50,60]

plt.hist(age,bins=years,color='m',histtype='bar',rwidth=0.6)

plt.xlabel('Patient Age')

plt.ylabel('No. of patients')

plt.title('Srvodaya Hospital')
```

plt.legend()

plt.show()



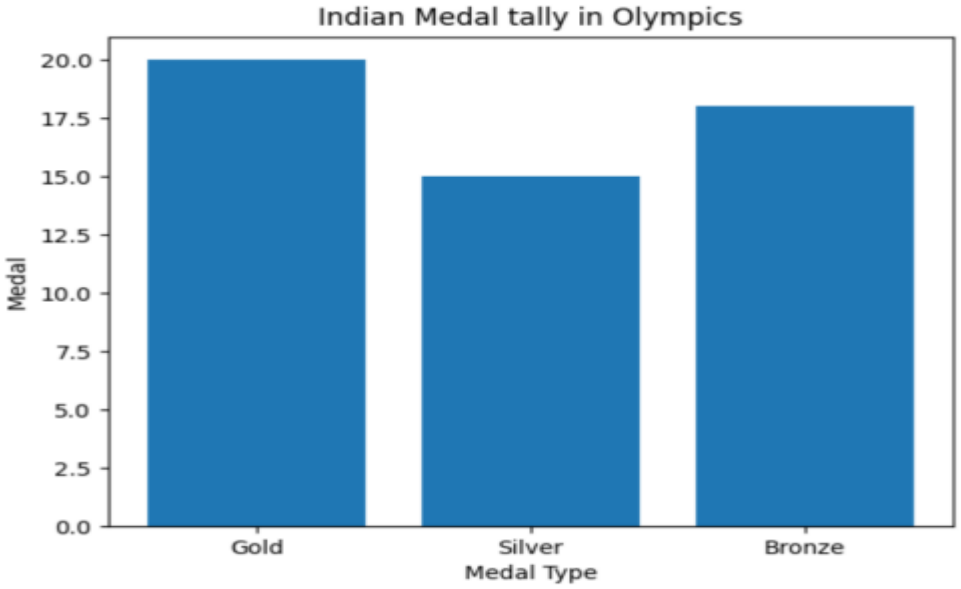
Note :rwidth =0.6 means that the bars width is 60% and there will be gap of 40% before and after the bar.

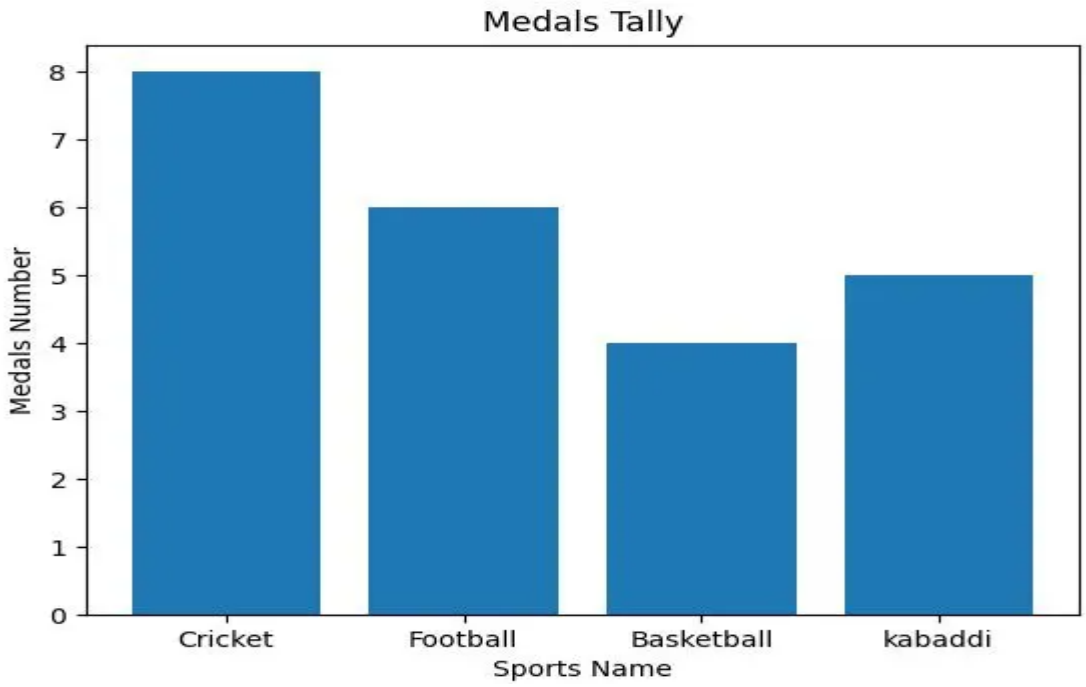
Multiple Choice Questions (1 mark)

1	The attribute used to change the color of marker in line chart is: i. marker ii. markersize iii. color **iv. markeredgecolor**
2	pyplot is used to construct …….. plots easily and interactively. a) 1D **b) 2D** c) 3D d) all of the above.
3	Which function is used for saving graphs . **a) savefig()** b) save() c) saveas() d) saveimage()
4	Name the marker type used for symbol ‘,’. a)pointer marker **b) pixel marker** c)pentagon marker d) x marker
5	…….. Method is used for plotting line graph. **a) Plot()** b) linespace() c) pyplot() d) line()
6	……Method is used for displaying of graphs to user. a) display() **b) show()** c) print() d) view()
7	which of the following is not linestyle in plot function. a) solid b) dashed c) dotted **d) circle**

8	which function is used for giving title name for graphs. **a) title()** b) label() c) titlebar() d)none of the above

LONG ANSWER QUESTIONS

Q1.	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]
Ans	import matplotlib.pyplot as plt Week=[1,2,3,4] Avg_week_temp=[40,42,38,44] plt.plot(Week,Avg_week_temp) plt.xlabel('Week') plt.ylabel('Average Temperature') plt.title('Averegae temperature of Delhi in 4 weeks') plt.show()
Q2.	Write Python code to plot a bar chart for India's medal tally as shown below: 
Ans	import matplotlib.pyplot as plt import numpy as np Medal_type=['Gold','Silver','Bronze'] No_of_medals=[20,15,18]

	ticks=np.linspace(0,20,9) plt.bar(Medal_type,No_of_medals) plt.xlabel('Medal Typr') plt.ylabel('Medal') plt.title('Indian Medal tally in Olympics') plt.xticks(Medal_type) plt.yticks(ticks) plt.show()
Q3	Dhriti wants to plot a line chart based on the given data to view the changing weekly average temperature for four weeks. Help her to write the code in Python. Also give appropriate chart title and axis titles. Week=[1,2,3,4] Temp=[30,34,28,32]
Ans	Week=[1,2,3,4] Temp=[30,34,28,32] plt.plot(Week,Temp) plt.xlabel('Week') plt.ylabel('Temperature') plt.title('Change in Temperature Weekly') plt.xticks(Week) plt.show()
Q4	Write a Python code to plot a bar chart shown below: 
Ans	import matplotlib.pyplot as plt import numpy as np Sports_name=['Cricket','Football','Basketball','Kabaddi'] No_of_medals=[8,6,4,5] ticks=np.linspace(0,8,9) plt.bar(Sports_name,No_of_medals)

	plt.xlabel('Sports Name') plt.ylabel('Medals Number') plt.title('Medal Tally') plt.xticks(Sports_name) plt.yticks(ticks) plt.show()
Q5	Amrita wants to create a line chart for the following data: Day | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday Tickets sold | 2000 | 2800 | 3000 | 2500 | 2500 | 2500 | 1000 Help her in writing the code for the same. Set the color of line to 'Magenta'. Also give appropriate chart title and axis titles.Also save the graph with the name 'tickets_sold.jpeg'
Ans	import matplotlib.pyplot as plt import numpy as np Day_Name=['Monday','Tuesday','Wednesday','Thursday','Friday','Saturday','Sunday'] Tickets_sold=[2000,2800,3000,2500,2500,2500,1000] plt.plot(Day_Name,Tickets_sold) plt.xlabel('Day') plt.ylabel('Tickets Sold') plt.title('Tickets sold per day in a week') plt.xticks(Day_Name) plt.show() plt.savefig('tickets_sold.jpeg')

Assertion Reasoning Based Question

1	Assertion (A): Data visualization refers to the graphical representation of information using visual elements like charts, graphs and maps etc. Reason (R): To install matplotlib, we can use the command pip install matplotlib (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer (B)**
2	Assertion (A): Data visualization is the process of creating visual representation of data to communicate information effectively. Reason (R): Data visualization helps to uncover patterns, trends, and insights in data that might not be apparent in raw data. (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer (A)**
3	Assertion (A): Bar graph is represented with the help the help of bars or rectangles

	Reason (R): Bar graphs can represent the data of single series and multiple series (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer(B)**
4	Assertion (A): plot() function of pyplot is to create line chart Reason (R): bar() function of pyplot is to create bar chart (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer (B)**
5	Assertion (A): The data points plotted on a graph are called markers. Reason (R): The width argument of plot() specifies the width for the line (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer (C)**
6	Assertion (A): The linestyle argument of plt() specifies the style of the line. Reason (R): The line argument of bar() specifies the bar width. (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer (C)**
7	Assertion (A): The xticks() function is used to specify the ticks for x-axis Reason(R): To save a plot, savefig() function is used. (A) Both (A) and (R) are true and R is the correct explanation of (A) (B) Both (A) and (R) are true but R is not the correct explanation of (A) (C) (A) is true but (R) is False (D) (A) is false but (R) is true **Answer (B)**

Unit 2: Database Query using SQL

Database - A database is collection of interrelated data; a database system is basically a computer record keeping system

Properties of data base

1. Databases Reduces Redundancy
2. Database Controls Inconsistency
3. Database facilitates Sharing data
4. Database ensures Security
5. Database maintains Integrity
6. Database enforces Standard

Common Databases (RDBMS)

1. Oracle, SQL Server, DB2, Foxpro etc – These are proprietary RDBMS
2. MySQL, SQLite, PostgreSQL etc – these are open source RDBMS

Common SQL Command Category:

1. Data Definition Language
2. Data Query Language
3. Data Manipulation Language,

Definitions:

DDL- Data Definition Language. SQL part-language that facilitates defining creation/modification etc. of database objects such as tables, indexes, sequences etc. For example, CREATE DATABASE, CREATE TABLE, DROP, ALTER.

DML- Data Manipulation Language. SQL part-language that facilitates manipulation (addition/ deletion/modification) of data residing in database tables. For example, INSERT, DELETE, UPDATE

Data Query: SELECT, FROM, WHERE with relational operators, BETWEEN, logical operators, IS NULL, IS NOT NULL

Relational Data Model- The data model wherein the data is organized into tables called relations. Relationship among multiple tables is established on the basis of common column.

Attribute- A column in a relation is called attribute.

Tuple - A row in a relation is called tuple.

Degree- Number of attributes in a relation is called its degree.

Cardinality- Number of tuples in a relation is called its cardinality.

Domain- A pool of values where from a field can draw values is called domain.

Primary Key- It is a key/attribute or a set of attributes that can uniquely identify tuples within the relation.

Candidate Key -All attributes combinations inside a relation that can serve as primary key are candidate key as they are candidates for being as a primary key or a part of it.

Alternatre key- The candidate key other than the primary key is called an alternate key.

DIFFERENCE BETWEEN DDL AND DML

DDL	DML
It stands for Data Definition Language.	It stands for Data Manipulation Language.
It is used to create database schema and can be used to define some constraints as well.	It is used to add, retrieve or update the data.
It basically defines the column (Attributes) of the table.	It add or updates the row of the table. These rows are called tuple.
Basic command present in DDL are CREATE, DROP, RENAME, ALTER etc.	BASIC command present in DML are UPDATE, INSERT, MERGE etc.
DDL is used to define the structure of a database.	DML is used to manipulate the data within the database.
DDL is used to create and modify database objects like tables, indexes, views, and constraints.	DML is used to perform operations on the data

DATABASE COMMANDS

VIEW EXISTING DATABASE : To view existing database names, the command is:

SHOW DATABASES;

CREATING DATABASE IN MYSQL : For creating the database in MySQL, we write the following command:

CREATE DATABASE <databasename>;

e.g. In order to create a database Student, command is:

CREATE DATABASE Student;

ACCESSING A DATABASE : For accessing already existing database,we write:

USE<databasename>;

e.g.to access a database named Student, we write command as:

USE Student;

DELETING DATABASE : For deleting any existing database,the command is:

DROP DATABASE <databasename>;

e.g.to delete a database, say student, we write command as:

DROP DATABASE Student;

VIEWING TABLE IN DATABASE

In order to view tables, present in currently accessed database, command is:

SHOW TABLES;

CREATING TABLES IN MYSQL

Syntax of CREATE TABLE command is:

CREATE TABLE **<table-name>(<colname> datatype, <colname> datatype,…);**

E.g. Inorder to create table EMPLOYEE given below:

ECODE	ENAME	GENDER	GRADE	GROSS

Create table employee (ecode integer, ename varchar(20),gender char(1),grade char(2),gross integer);

Inserting Data into Table:

Syntax:

Insert into <tablename> values(<v1>,<v2>,…);

Or

Insert into <tablename>(<column list>)values(<values list>);

Eg: insert into employee values (1001, 'Ravi','M','E4',50000);

Or

Insert into employee (ecode, ename) values(1002,'Meena');

The left-out columns will be filled with null values.

Select Command:

It helps to display the records as per our requirement.

Different forms of select command:

1. Select * from employee;

It displays all rows and columns from the table.

2. Select ecode, ename from employee;

It displays selected columns from the table.

3.select * from <tablename> where <cond>;

Eg. Select * from employee where gender='M';

For displaying particular rows.

ELIMINATING REDUNDANT DATA

DISTINCT(GENDER)
M
F

The distinct keyword is used to eliminate duplicate records from the table. Eg. Select distinct (gender) from employee;

USING COLUMN ALIASES

The columns that we select in a query can be given a different name, i.e. column alias name for output purpose.

Syntax: SELECT <columnname> AS **column alias, <columnname>** AS **column alias**
…..FROM <tablename>;

Eg.select ecode as "EMP_Code" from employee;

CONDITION BASED ON A RANGE

The **BETWEEN** operator defines a range of values that the column values must fall into make the condition true. The range include both lower value and upper value.

e.g.To display ECODE,ENAME and GRADE of those employees whose salary is between 40000 and 50000,command is:

SELECT ECODE, ENAME, GRADE FROM **EMPLOYEE**
WHERE GROSS **BETWEEN** 40000 AND 50000;

NOTE: For displaying records not in the specified range, we have to use **not between** operator.

CONDITION BASED ON PATTERN MATCHES

LIKE operator is used for pattern matching in SQL. Patterns are described using two special wildcard characters: % and _ (underscore)

1. Percent (%)– The % character matches any substring.

e.g. To display names of employee whose name starts with R in EMPLOYEE table, the command is:

select ename from employee where ename like “R%”;

2. Underscore (_)– The _ character matches any single character.
   e.g. To display details of employee whose second character in name is:

   select * from employee where ename like ‘_e%’;

SEARCHING FOR NULL

The NULL value in a column can be searched for in a table using IS NULL in the WHERE clause. E.g. to list employee details whose salary contain NULL, we use the command:

Select * from employee where gross is null;

Note: For listing employees who earn salary, then it is:

Select * from employee where gross is not null;

Relational Operators

To compare two values, a relational operator is used. The result of the comparison is true or false. Relational Operators recognized by SQL: =, >, <, <=, >=, <> (not equal or !=)

Eg. Select * from employee where ecode <> 1001;

Above query will not display those employee details whose ecode column value is 1001.

Logical Operators- (OR, AND, NOT)

To list the employee details having grades E2 or E3.

Select ecode, ename, grade, gross from employee where (grade=‘E2’ OR grade=‘E3’);

To list all the employees’ details having grades as ‘E4’ but with gross < 9000.

Select ecode, ename, grade, gross from employee where grade=‘E4’ and gross< 9000;

To list all the employees’ details whose grades are other than ‘G1’.

Select ecode, ename, grade, gross from employee where (NOT grade= ‘G1’);

DELETE Command

This command removes rows from a table.

Syntax: DELETE FROM <tablename> [WHERE <cond>];

Eg: To remove all the contents of items table, the query is:

DELETE from items;

Eg: To remove the tuples from employee that have gross less than 20000 is :

DELETE from employee WHERE gross<20000;

UPDATE Command

Update Command allows to change some or all the values in an existing rows. Update command specifies the rows to be changed using the WHERE clause and the new data using the SET keyword.

Eg: UPDATE employee SET gross= 25000;

The above query sets the gross of all records as 25000.

UPDATE employee SET gross=40000, grade=’A’ WHERE ecode=1001;

The above query changes the gross and grade values for the record with ecode 1001.

ALTER TABLE

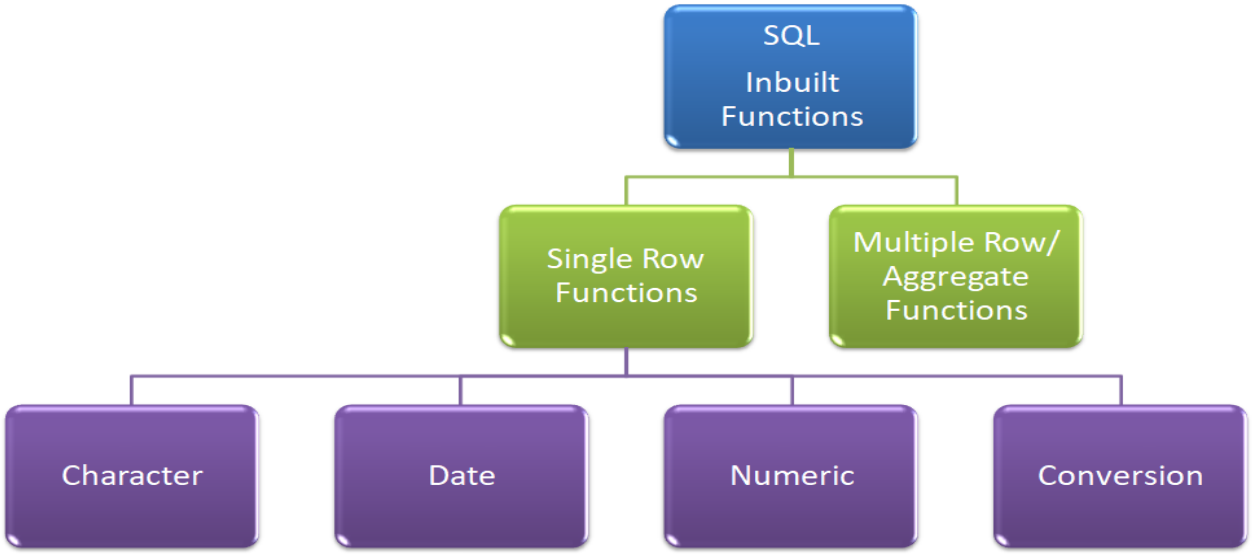
ALTER TABLE command is used to change the structure of the existing table. It can be used to add or drop new columns or modify the existing columns of table.

Eg. Alter table Employee Add comm int;
ALTER TABLE Emp MODIFY (ename varchar(60));
Alter table emp drop comm;

DROP TABLE:
DROP TABLE command allows to remove a table from database. Once the DROP command is issued, the table will no longer be available in the database.
Eg. DROP TABLE employee;

DATABASE QUERY USING SQL

SQL Functions
1. A function is used to perform some particular task and it returns zero or more values as a result.
2. Functions can be applied on single or multiple records (rows) of a table. Depending on their application in one or multiple rows, SQL functions are categorized as Single row functions and Aggregate functions.



Single Row Functions
1. These are also known as Scalar functions.
2. Single row functions can be applied on a single value ,as well as a column.
3. When applied to a column of a table, they yield one value for each row, i.e., if they are applied on 10 rows, we get 10 values as output.
They are categorized into:
1. Numeric functions,
2. String functions
3. Date functions.

Numeric Functions

These functions take numeric values (numbers) as arguments.

S.NO.	NAME OF FUNCTION WITH SYNTAX	DESCRIPTION	EXAMPLE
1.	**POWER(X,Y)** **Or, POW(X,Y)**	**RETURNS X^Y** (X Raised To The Power Y)	1. SELECT POWER(3,4) RESULT: 81 2. SELECT POWER(-2,4) RESULT: 16
2.	**ROUND(X,D)**	**ROUNDS OFF X TO D DECIMAL PLACES.** If the digit to be dropped is less than 5, the preceding digit is not changed. Otherwise, it is increased by 1. If the value of D is not specified then default value 0 is taken and the number gets converted to an integer. If the value of D is negative then rounding off on the left-hand side of decimal.	(i) SELECT ROUND (-1.23); Result: -1 (ii) SELECT ROUND (-1.58); Result: -2 (iii) SELECT ROUND (1.58); Result: 2 (iv)SELECT ROUND (3.798, 1) Result: 3.8 (v) SELECT ROUND (1.298, 0); Result: 1 (vi) SELECT ROUND (23.298, -1); Result: 20 (vii) SELECT ROUND(154.45, -2); Result: 200
3.	**MOD (X, Y)**	**CALCULATES AND RETURNS THE REMAINDER WHEN X IS DIVIDED BY Y**	SELECT MOD (21, 2); Result: 1.

STRING FUNCTIONS

These functions manipulate the character string data effectively.

S.No	NAME OF FUNCTION WITH SYNTAX	DESCRIPTION	EXAMPLE
1.	**LENGTH(S)**	**RETURNS NUMBER OF CHARACTERS IN THE STRING.** *All the spaces, commas or any other symbol present in the string are to be added.	SELECT LENGTH('INFORMATICS') Result:11
2.	**LCASE(S)** **Or,** **LOWER(S)**	**Returns the argument in lowercase (small letters).**	SELECT LOWER('INFORMATICS') Result: informatics SELECT LCASE('INFORMATICS') Result: informatics

3.	**UCASE(S)**	**Returns the argument in uppercase (capital letters).**	SELECT UCASE('informatics') Result : INFORMATICS SELECT UPPER('informatics') Result : INFORMATICS
4	**MID(S,M,N)** **Or,** **SUBSTR(S,M,N)** **Or,** **SUBSTRING(S,M,N)**	**Returns <N> characters starting from the M character of the string <S>.** If the third argument <N> is missing, then starting from the Mth position, the rest of the string is returned. If <M> is negative, the beginning of the substring is the Mth character from the end of the string Original String is unchanged.	SELECT MID ('Python program'3,5) RESULT: thon select mid ('Python Programming', - 4,4); RESULT: ming
5	**LEFT(S,N)**	**Extracts and returns N characters from the left side of the string S.**	SELECT LEFT('PYTHON',3) RESULT: PYT
6.	**RIGHT(S,N)**	**Extracts and returns N characters from the right side of the string S.**	SELECT RIGHT('PYTHON',3) RESULT: HON
7.	**TRIM(S)**	**TRIM() function in MySQL is is used to remove the unwanted leading and trailing characters in a string.** **Syntax :** **TRIM([{BOTH | LEADING | TRAILING} [remstr] FROM] str)**	SELECT TRIM(" DELHI "); RESULT: DELHI
8.	**LTRIM(S)**	**Removes leading spaces from the string S**	SELECT LTRIM(" DELHI"); RESULT: DELHI
9.	**RTRIM(N)**	**Removes trailing spaces from the string S**	SELECT RTRIM("DELHI "); RESULT: DELHI
10	**INSTR (S1, S2)**	**Tells the position of first occurrence of S2 within S1.**	SELECT INSTR ('PYTHON','ON'); RESULT: 5

DATE FUNCTIONS

Date Time functions manipulate the display format of dates and time.

S.No	NAME OF FUNCTION WITH SYNTAX	DESCRIPTION	EXAMPLE
1.	**NOW ( )**	**It returns the current system date and time**	SELECT NOW() RESULT: 2022-10-02 17:58:15
2.	**DATE(DT)**	**It returns the date part from the given date/ time expression.**	SELECT DATE(NOW()) RESULT: 2022-10-02
3.	**DAY(D)**	**It returns the day part from the date.**	SELECT DAY ('2022-10-02') RESULT: 2
4.	**MONTH(D)**	**It returns the month in**	SELECT MONTH ('2022-10-02')

		numeric form from the date.	RESULT: 10
5.	**YEAR(D)**	**It returns the year from the date.**	SELECT YEAR ('2022-10-02') RESULT: 2022
6.	**DAYNAME(D)**	**It returns the name of the day from the specified date.**	SELECT DAYNAME ('2022-10-02') RESULT: SUNDAY
7.	**MONTHNAME(D)**	**It returns the month name from the specified date.**	SELECT MONTHNAME ('2022-10-02') RESULT: OCTOBER

Aggregate Functions

Aggregate functions are also called multiple row functions. These functions work on a set of records as a whole, and return a single value for each column of the records on which the function is applied. Aggregate Functions is used to perform calculation on group of rows and return the calculated summary like sum of salary , average of salary. Aggregate function **will not consider NULL values** for calculation

1. MAX( )
2. MIN( )
3. AVG()
4. SUM( )
5. COUNT()

(i) MAX(): This function returns the maximum value in selected columns. MAX() function ignores NULL values and considers all values in the calculation.

Syntax:

SELECT MAX(Column_Name) FROM Table_ Name;

(ii) MIN(): This function returns the minimum value in selected columns. MIN() function ignores NULL values.

Syntax:

SELECT MIN(Column_Name) FROM Table_ Name;

(iii) AVG(): This function calculates the average of specified column(s). It ignores NULL values.

Syntax:

SELECT AVG(Column_Name) FROM Table_ Name;

(iv) SUM(): This function calculates the sum of all values in the specified columns. It accepts only the expression that evaluates to numeric values. It ignores NULL values.

Syntax:

SELECT SUM(Column_Name) FROM Table_ Name;

(v) COUNT(<column>): This function returns the number of cells having values in the given column.
If used with keyword distinct, it counts one value once.
If used with *, returns the cardinality of the table.
Syntax:

Select count([distinct]<column>/*) form <tablename>

The GROUP BY Statement

The GROUP BY statement is used in conjunction with the aggregate functions to group the result-set by one or more columns.

Syntax:

SELECT column_name, aggregate_function(column_name) FROM table_name

WHERE column_name operator value GROUP BY column_name

Example: We have the following "Orders" table:

O_Id	OrderDate	OrderPrice	Customer
1	2018/11/12	1000	Vivek Kumar
2	2021/10/23	1600	Nitesh Sharma
3	2020/09/02	700	Vivek Kumar
4	2019/09/03	300	Vivek Kumar
5	2020/08/30	2000	Samarjeet Gupta

Now we want to find the total sum (total order) of each customer.
We will have to use the GROUP BY statement to group the customers.
We use the following SQL statement:

```
SELECT Customer,SUM(OrderPrice)
FROM Orders
GROUP BY Customer
```

The result-set will look like this:

Customer	SUM(OrderPrice)
Vivek Kumar	2000
Nitesh Sharma	1700
Samarjeet Gupta	2000

SQL GROUP BY with HAVING clause

The HAVING clause was added to MySQL because the WHERE keyword could not be used with aggregate functions.

Syntax:

```
SELECT column_name, aggregate_function(column_name)
FROM table_name
WHERE column_name operator value
GROUP BY column_name
HAVING aggregate_function(column_name) operator value
```

Now we want to find if any of the customers have a total order of less than 2000 from the above ORDER TABLE

We use the following SQL statement:

```
SELECT Customer,SUM(OrderPrice)
FROM Orders GROUP BY Customer
HAVING SUM(OrderPrice)<2000
```

The result-set will look like this:

Customer	SUM(OrderPrice)
Nitesh Sharma	1700

Now we want to find if the customers "Vivek Kumar" or "Samarjeet Gupta" have a total order of more than 1500.

We add an ordinary WHERE clause to the SQL statement:

```
SELECT Customer, SUM(OrderPrice)
FROM Orders WHERE Customer='Vivek Kumar' OR Customer='Samarjeet Gupta'
GROUP BY Customer
HAVING SUM(OrderPrice)>1500
```

The result-set will look like this:

Customer	SUM(OrderPrice)
Vivek Kumar	2000
Samarjeet Gupta	2000

SORTING USING ORDER BY CLAUSE

The SQL ORDER BY clause is used to sort data in ascending or descending order based on one or more columns.

It sorts record in ascending order by default.

To sort data in descending order DESC keyword is used.

Syntax

```
SELECT <column-names> FROM <table-name> [WHERE <condition>]
ORDER BY <column-name> [ASC, DESC]
```

Example:
Consider the following table emp.

EID	ENAME	SALARY	DEPT
1000	ARJUN	38000.00	ACCOUNTS
1001	ARTI	34000.00	IT
1002	KIRAN	45000.00	SALES
1003	HEMANTH	23000.00	IT
1004	KARTHIKA	40000.00	SALES
1006	ANAND	45000.00	ACCOUNTS

The following query selects details of all the employees in ascending order of their salaries.

```
mysql> SELECT * FROM EMPLOYEE ORDER BY SALARY;
```

EID	ENAME	SALARY	DEPT
1003	HEMANTH	23000.00	IT
1001	ARTI	34000.00	IT
1000	ARJUN	38000.00	ACCOUNTS
1004	KARTHIKA	40000.00	SALES
1002	KIRAN	45000.00	SALES
1006	ANAND	45000.00	ACCOUNTS

Working with two tables using equi-join

Equi-Join: This type of join combines tables based on matching values in specified columns(keys). Equi-joins are the most common type of join in relational databases.

The EQUI JOIN in SQL performs a JOIN against a column of equality or the matching column(s) values that have the associated tables. Here, we use an equal sign (=) as a comparison operator in our 'where' clause to refer to equality.

Syntax:

```
SELECT column_list
FROM table_x, table_y
WHERE table_x.column_name = table_y.column_name;
```

Consider the following tables EMPLOYEE and SALGRADE

EMPLOYEE

ECODE	NAME	DESIG	SGRADE	DOJ	DOB
101	Abdul	EXECUTIV	S03	23-Mar-2003	13-Jan-1980
102	Ahmad	E	S02	12-Feb-2010	22-Jul-1987
103	Ravi	HEAD-IT	S03	24-Jun-2009	24-Feb-1983
105	Chander	RECEPTIO	S02	11-Aug-	03-Mar-1984
108	John Cen	NIST	S01	2006	19-Jan-1982
	Naza Ameen	GM		29-Dec-2004	
	Priyam Sen	CEO			

SALGRADE

SGRADE	SALARY	HRA
S01	56000	18000
S02	32000	12000
S03	2400	8000

```
SELECT NAME, SALARY
FROM EMPLOYEE E, SALGRADE S
WHERE E.SGRADE = S.SGRADE;
```

Find output for 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

PRACTICE QUESTIONS

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 mod(23,2), mod(78,4);
5. select lower("INFORM"),lcase("Class XII");
6. select upper("Class xii"),ucase("informatics");
7. select substring("India is the Best",3,2),substr("Indian",-2,1);
8. select length(trim(" abcde defe "));
9. select instr("Informatics","r");
10. select length("ab cde fge");
11. select left("Informatics",4) from dual;
12. select right("Informatics",6);
13. select mid("Indian School Muscat",8,6);
14. Select date(now());
15. Select month(now());

Short Answer Questions

1	Which function is used to display the total number of records from table in a database? (a) sum(*) (b) total(*) (c) count(*) (d) return(*)
Ans	(c) count(*)
2	Which of the following is a DDL command? a) SELECT b) ALTER c) INSERT d) UPDATE
Ans	b)Alter
3	Predict the output of the following query: SELECT Lower (MONTHNAME ('2023-03-05')); i. May ii. March iii. may iv. march
Ans	iv.march
4	Write the output of the following SQL command. select round(49.88); a. 49.88 b. 49.8 c. 49.0 d. 50
	d. 50
5	Which one of the following functions is used to find the largest value from the given data in MySQL? i. MAX( ) ii. MAXIMUM( ) iii. BIG( ) iv. LARGE( )
Ans	i. MAX( )
6	In SQL, write the query to display the list of tables stored in a database.
Ans	Show tables;
7	Which of the following is not an aggregate function of MySQL? (a) AVG() (b) SUM() (c) ADD() (c) MIN()
Ans	(c) ADD
8	Which SQL statement do we use to find out the total number of records present in the table SALES? (a) SELECT * FROM SALES; (b) SELECT COUNT (*) FROM SALES; (c) SELECT FIND (*) FROM SALES; (d) SELECT SUM () FROM SALES;
	(b) SELECT COUNT (*) FROM SALES;
9	Which clause is used with “aggregate functions”? (a) GROUP BY (b) SELECT c) WHERE d) Both (a) and (b)

Ans	a)GROUP BY
10	Which one of the following functions is used to find the smallest value (a) MINIMUM( ) (b) MIN( ) (c) SHORT( ) (d) SMALL( )
Ans	(b) MIN( )

ASSERTION REASONING BASED QUESTION

Q1	**Assertion(A)** : Alter table query can be used to add a column in a table **Reasoning(R)** : Alter is a DML Query and is used to make changes in the table design 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
Ans	iii. A is True but R is False
Q2	**Assertion (A): FLOAT and DOUBLE are data types** **Reason (R): Both can hold any number upto 23 digits** 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
	iii. A is True but R is False
Q3	Assertion (A): The HAVING clause is used with aggregate functions Reason (R): WHERE clause places condition on individual rows 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
Ans	ii. Both A and R are true and R is not the correct explanation for A
Q4	Assertion(A):- Sum() & Avg() are aggregate Functon Reasoning (R.)- These can work on multiple function 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
Ans	i. Both A and R are true and R is the correct explanation for A
Q5	Assertion (A): The PRIMARY KEY constraint is given with column Reasoning (R): NULL values are not allowed to be entered using the NOT NULL constraint 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
Ans	ii. Both A and R are true and R is not the correct explanation for A

SQL- LONG QUESTION ANSWER

Q1

a)Create a table patient having column patient_id, patient_name , Pat_address

PATIENT_ID,	PATIENT_NAME	PAT_ADDRESS

b)Add a new column pat_contact in table patient

Ans

a)Create table patient(patient_id int, patient_name varchar(20) , Pat_address varchar(20))
b)Alter table patient Add (pat_address int(10))

Q2

Adhir, a database administrator has designed a database for cars showroom. Helpher by writing answers to the following questions based on the given table:

SALE

InvoiceNo	CarId	CustId	SaleDate	PaymentMode	EmpId	SalePrice
101	D01	C01	2019-01-24	Credit Card	E04	613247.00
102	S01	C02	2018-12-12	Online	E01	590321.00
103	S02	C04	2019-01-25	Cheque	E10	604000.00
104	D01	C01	2018-10-15	Bank Finance	E07	659982.00
105	E01	C03	2018-12-20	Credit Card	E02	369310.00

(i) Write a query to display invoice number and name of month in which car is purchased.
(ii) Write a query to display highest price.
(iii) Write query to display all the information in descending order of sale price.

OR (for part iii only)

Write query to display the number of cars purchased through each paymentmethod.

Ans

(i) SELECT INVOICENO, MONTHNAME(SALEDATE)FROM SALE;
(ii) SELECT MAX(SALEPRICE)FROM SALE;
(iii) SELECT * FROM SALE ORDER BY SALEPRICE DESC;

OR

(iii)SELECT COUNT(CARID)FROM SALE GROUP BY PAYMENTMODE;

Q3

Based on the table STUDENT given here, write suitable SQL queries for the following

RollNo	Name	Class	Gender	Height	Weight
1	Amit	XI	M	168	72
2	Ashok	XII	M	169	71
3	Arun	X	M	163	70
4	Diksha	XII	F	159	61
5	Akanksha	XI	F	156	60
6	Sita	XI	F	162	63
7	Gita	XI	F	157	58
8	Ram	X	M	159	59

(i) Display total number of male and female students.
(ii) Display gender wise minimum weight.
(iii) Display class wise tallest student

OR

What are aggregation functions? Name all the aggregation functions. Writeexamples

for all the aggregation functions.

Ans

i. SELECT COUNT(GENDER)FROM STUDENT;
ii. SELECT MIN(WEIGHT)FROM STUDENT GROUP BY GENDER;
iii. SELECT MAX(HEIGHT)FROM STUDENT GROUP BY CLASS;

OR

An aggregate function performs a calculation on a set of values, and returns a single value.

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

Eg: SELECT COUNT(GENDER)FROM STUDENT;
SELECT MIN(WEIGHT)FROM STUDENT;
SELECT MAX(HEIGHT)FROM STUDENT;

Q4 Write outputs for SQL queries (i) to (iii) which are based on the given table STUDENT:

TABLE: STUDENT

ADMNO	NAME	CLASS	DOA	MARKS
1001	Sam	10	25-12-2000	96
1002	Sunil	12	20-09-1998	80
1003	Seema	11	17-08-2000	86
1004	Tarun	10	25-03-2002	68

i. SELECT LOWER(NAME) FROM STUDENT WHERE MARKS BETWEEN 80 AND 90;
ii. SELECT NAME FROM STUDENT WHERE MONTH(DOA)=8;
iii. SELECT SUM (MARKS) FROM STUDENT WHERE CLASS= 10;

Ans

i.

LOWER(NAME)
sunil
seema

ii.

NAME
Seema

iii.

SUM (MARKS)
164

Q5 Based on table **EMPLOYEES** given here, write suitable SQL queries for the following:

Emp_ID	Name	Gender	City	Salary
1001	Ram	M	Agra	42000
1002	Pravesh	M	Mumbai	45000
1003	Sneha	F	Agra	90000
1004	Preeti	F	Mumbai	38478
1005	Himnashu	M	Delhi	23484
1006	Anchal	F	Dubai	29000

	i. Display gender wise highest salary. ii. Display city wise lowest salary. iii. Display total number of male and female employees.
	i. SELECT Gender, MAX(Salary) FROM EMPLOYEES GROUP BY Gender; **ii. SELECT City, MIN(Salary) FROM EMPLOYEES GROUP BY City;** **iii.SELECT Gender, COUNT(*) FROM EMPLOYEES GROUP BY Gender;**
Q6	Write suitable SQL query for the following: i. Display 4 characters extracted from 4th left character onwards from the string 'INFORMATICS PRACTICES'. ii. Display the position of occurrence of string 'ON' in the string 'PYTHON PROGRAMMING'. iii. Round off the value 446.723 to two decimal place. iv. Display the result of 4 raised to 5. v. Remove all the expected leading spaces from a column employeeid of the table 'EMPLOYEES'.

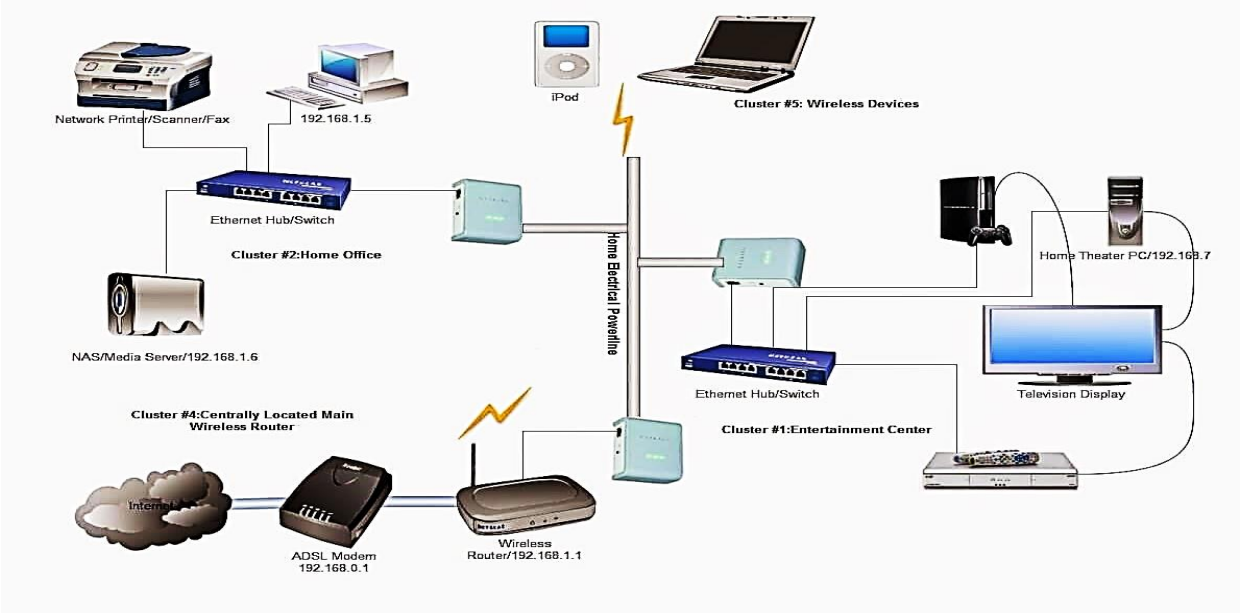
Ans	i.SELECT SUBSTR('INFORMATICS PRACTICES',4,4); OR
	SELECT MID('INFORMATICS PRACTICES',4,4);
	ii.SELECT INSTR ('PYTHON PROGRAMMING', 'ON');
	iii. SELECT ROUND(446.723,2);
	iv. SELECT POW(4,5);
	v. SELECT LTRIM(employeeid) FROM EMPLOYEES;

Q7	Consider the given table Faculty :- Faculty_Id First_name Last_name Hire_date Salary 1102 Sulekha Mishra 12-10-1997 25000 1203 Naveen Vyas 23-12-1994 18000 1404 Rakshit Soni 25-08-2003 32000 1605 Rashmi Malhotra 18-09-2004 21000 1906 Amit Srivastava 05-06-2007 28000 Write SQL commands to : a. To display details of those faculty members whose First_name ends with 't'. b. Display all records in descending order of Hire_date. c. Find the maximum and minimum salary.
Ans	a. Select * from Faculty where First_name like '%t'; b. Select * from Faculty order by Hire_date desc; c. Select max(Salary), min(Salary) from Faculty;

UNIT 3
INTRODUCTION TO COMPUTER NETWORKS

Network

The collection of interconnected computing devices is called a network. Two computing devices are said to be interconnected if they are capable of sharing and exchanging information.



Advantages of Network

(1) **Resource Sharing:** Resource Sharing means to make the applications/programs, data(files) and peripherals available to anyone on the network irrespective of the physical location of the resources and the user.

(2) **Reliability:** Reliability means to keep the copy of a file on two or more different machines, so if one of them is unavailable (due to some hardware crash or any other) them its other copy can be used.

(3) **Cost Factor:** Cost factor means it greatly reduces the cost since the resources can be shared. For example a Printer or a Scanner can be shared among many computers in an office/Lab.

(4) **Communication Medium:** Communication Medium means one can send and receive messages. Whatever the changes at one end are done, can be immediately noticed at another.

Types of Computer Network

A computer network may be small or big as per number of computers and other network devices linked together. A computer network may contain devices ranging from handheld devices (like mobile phones, tablets, laptops) connected through Wi-Fi or Bluetooth within a single room to the millions of computers spread across the globe. Based on the size, coverage area, data transfer speed and complexity, a computer network may be classified as:

LAN (Local Area Network): A Local Area Network (LAN) is a network that is limited to a small area. It is generally limited to a geographic area such as within lab, school or building. It is generally privately-owned networks over a distance up to a few kilometers. Now-a-days, we also have WLAN (Wireless LAN) which is based on wireless network.

MAN (Metropolitan Area Network): MAN is the networks cover a group of nearby corporate offices or a city and might be either private or public. Cable TV network or cable based broadband internet services are examples of MAN.

WAN (Wide Area Network): These are the networks spread over large distances, say across countries or even continents through cabling or satellite uplinks are called WAN. Typically, a WAN combines multiple LANs that are geographically separated. It is a network of network. The world's most popular WAN is the Internet.

PAN (Personal Area Network): A Personal Area Network is computer network organized round an individual person. It generally covers a range of less than 10 meters. Personal Area Networks can be constructed with cables or wirelessly.

Comparison between PAN, LAN, MAN and WAN: -

Parameter	PAN	LAN	MAN	WAN
Area covered	Small Area (upto 10m radius)	A building or campus (upto 1 km)	A city (upto 100 Km radius)	Entire country, Continent or Globe
Networking Cost	Negligible	Inexpensive	Expensive	Very expensive
Transmission Speed	High speed	High speed	Moderate speed	Low speed
Error Rate	Lowest	Lowest	Moderate	Highest
Network Devices used	WLAN, USB Dongle, Blutooth	LAN/WLAN, HUB/Switch, Repeater, Modem	Router, Gateway	Router, Gateway
Technology/ Media used	Infrared, Bluetooth	Ethernet, Wi- Fi	Optical fiber, Radio wave, Microwave	Microwave, Satellite

Network Devices: Hardware device that are used to connect computers, printers, fax machines and other electronic devices to a network are called network device. There are many types of network devices used in networking and some of them are described below:

MODEM (Modulator Demodulator): It is a device that converts digital signal to analog signal (modulator) at the sender's site and converts back analog signal to digital signal (demodulator) at the

receiver's end, in order to make communication possible via telephone lines. It enables a computer to transmit data over telephone or cable lines.

There are two types of MODEM, which are as follows

(i) Internal Modem Fixed within a computer.

(ii) External Modem Connected externally to a computer.

Hub: A Hub is a connecting device which connects multiple computers together to form a Local Area Network (LAN). Hubs make broadcast type Network and do not manage traffic over the network channel. Signal entering any port is broadcast out on all other ports. It broadcast the signals to all computers connected in the network. It provides various RJ-45 ports to connect Twisted Pair cable in STAR topology, making them act as a single network segment. Now days, Switch is used in place of Hubs.

Types of Hub:

- **Active Hub:** Amplifies the signal when required and works as a Repeater.
- **Passive Hub:** It simply passes the signal without any change.

Switch: A switch is a hardware device, which is used to connect several nodes to form a Network. It redirects the received signals only to the intended Node i.e. controls Network traffic.

It is also used to segment a big network into different Sub networks (Subnet) to control the network traffic and security. It can also use to combine various small network segments to form a big Network (as in Tree topology).

Repeater: Repeater is a hardware device, which is used to amplify the signals when they are transported over a long distance. The basic function of a repeater is to amplify the incoming signal and retransmit it, to the other device.

Router: A router is used to connect different networks together.
A router is a network device that forwards data from one network to another.
A router works like a bridge but can handle different protocols.

Gateway: A gateway is a device, which is used to connect dissimilar networks. The gateway establishes an intelligent connection between a local network and external networks, which are completely different in structure.

- Gateway is also called protocol converter that convert data packets from one protocol to other and connects two dissimilar networks.
- A gateway can be implemented in hardware, software or both, but they are usually implemented by software installed within a router.
- A LAN gets connected to Internet (WAN) using a gateway.

Network Topologies:

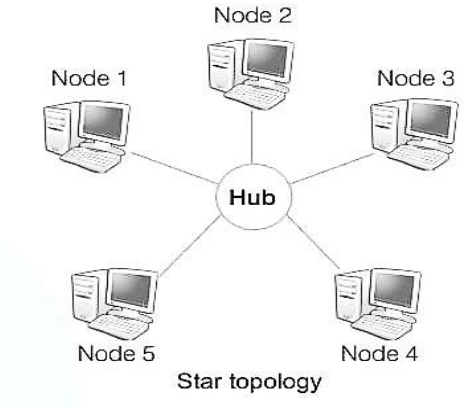
Topology: Topology refers to the way in which the device/computer/workstations attached to the network are interconnected.

The layout of interconnection of devices in a network is called Topology.
Different Topologies are: Star, Bus, Tree, Mesh.

STAR Topology: -In Star topology, each node is directly connected to a central device like Hub or Switch. It is most popular topology to form Local Area Networks (LAN).

Advantages:

(i) Easy to troubleshoot
(ii) A single node failure does not affects the entire network.
(iii) Fault detection and removal of faulty parts is easier.
(iv) In case a workstation fails, the network is not affected.

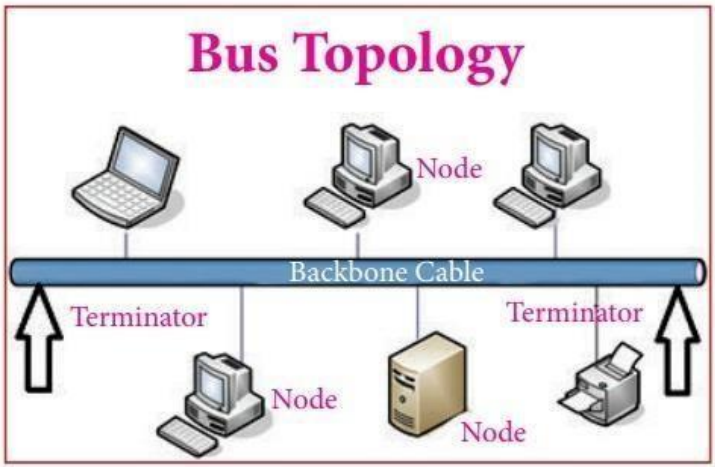


Star topology

Disadvantages:

(i) Difficult to expand.
(ii) Longer cable is required.
(iii) The cost of the hub and the longer cables makes it expensive over others.
(iv) All nodes are dependent on central node. If the central device (Switch) goes down then entire network breaks down.

BUS Topology: The bus topology uses a common single cable (backbone cable) to connect all the workstations. Each computer performs its task of sending messages without the help of the central server. However, only one workstation can transmit a message at a particular time in the bus topology.



Advantages:

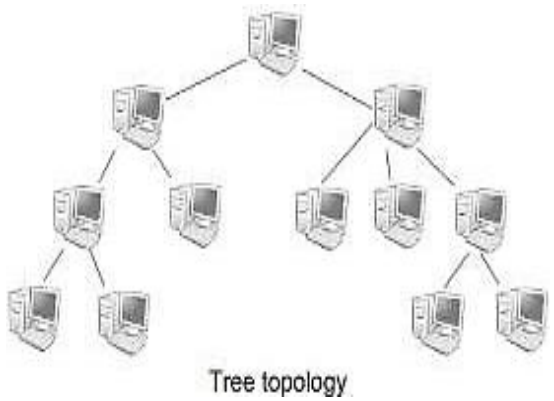
(i) Easy to connect and install.
(ii) Involves a low cost of installation time.
(iii) Can be easily extended.

Disadvantages:

(i) The entire network shuts down if there is a failure in the central cable.
(ii) Only a single message can travel at a particular time.

(iii) Difficult to troubleshoot an error.

TREE Topology: The tree topology combines the characteristics of the linear bus and the star topologies. It consists of groups of star – configured workstations connected to a bus backbone cable.


Tree topology

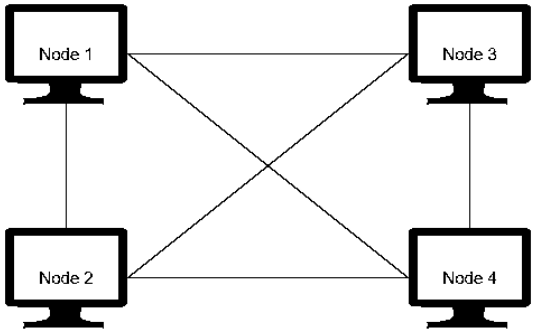
Advantages:

(i) Eliminates network congestion.
(ii) The network can be easily extended.
(iii) Faulty nodes can easily be isolated from the rest of the network.

Disadvantages:

(i) Uses large cable length.
(ii) Requires a large amount of hardware components and hence is expensive.
(iii) Installation and reconfiguration are very difficult.

Mesh Topology: In a mesh topology, every device is connected to every other device, creating redundant paths.



Advantages:

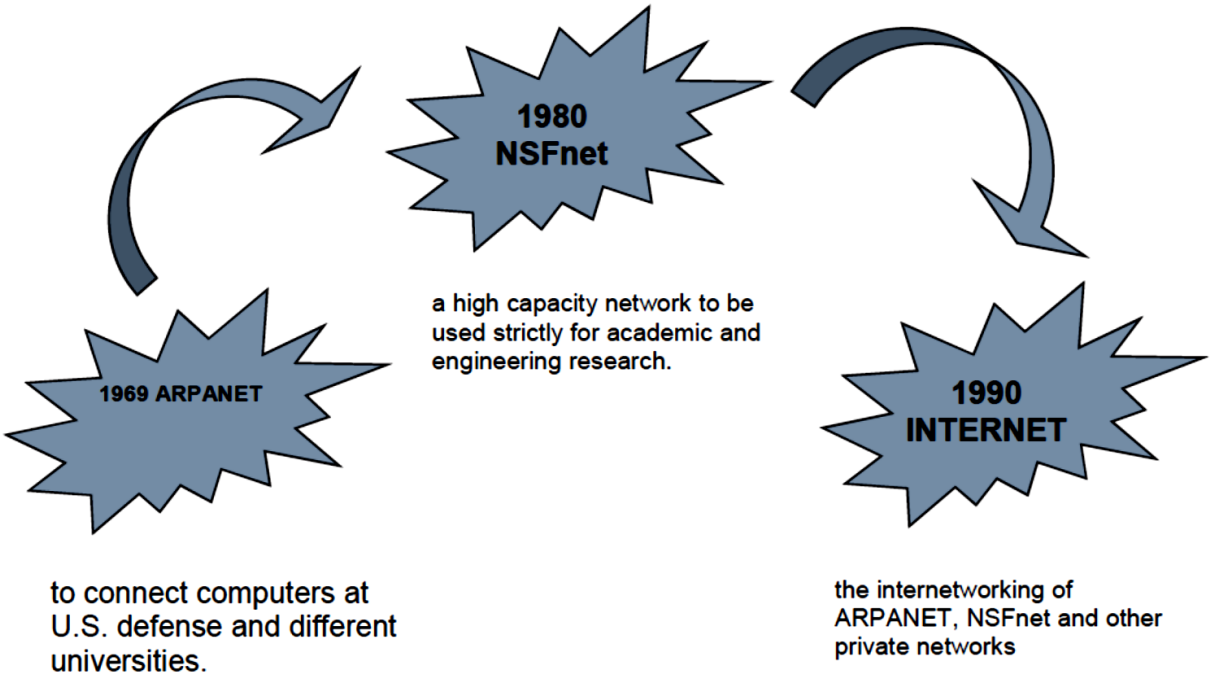
(i) High redundancy and fault tolerance.
(ii) No single point of failure.

Disadvantages:

(i) High cabling and configuration complexity.
(ii) Cost-prohibitive for large networks due to the number of connections.

Internet

Internet is a network of connected networks spread across the globe. It is an example of WAN. Internet (interconnected network) was initially developed to aid in the progress of computing technology by linking academic computer centers. The Internet we use today started being developed in the late 1960s with the start of ARPANET. Advanced Research Project Agency Network (ARPANET) was a project sponsored by U.S. Department of Defense with a goal to connect all the computers at different universities and U.S. Defense Department.



It connects many smaller networks and allows all the computers to exchange information following a common set of rules for communication also known as protocols. One of such protocols used by the Internet is TCP/IP (Transmission Control Protocol / Internet Protocol). Devices like Modem, Gateway, Router and Switches play important role in Internet. Few important points related to Internet are as below:-

- The World Wide Web or web is a platform with various websites that helps us to access global information over the Internet.
- A web-browser application is mainly important that helps us to access all the information's from various websites through Internet.
- The Internet and the WWW are not the same.
- The Internet is explored for information using a browser and it is known as browsing the Internet.
- Users browse websites and web pages by following hyperlinks that point to an address more commonly referred to as a URL.
- Finding information on the Internet is achieved by using a search engine. Eg. Google.
- Files, pictures, songs, and video can be shared by downloading (receiving) and uploading (sending) using FTP (File Transfer Protocol).
- The Internet utilizes the TCP/IP protocol and is accessed using a computer modem, broadband, 3G, 4G, or network that is connected through an ISP (Internet Service Provider) Eg. MTNL, BSNL, Jio, Airtel, etc.
- The computer you're using to view a web page is considered a host and it's connected to a server to show the web page.

URL

A URL (Uniform Resource Locator), more commonly known as a web-address, specifies the location of a resource (such as a web page) on the internet. A URL is human-readable text that was designed to replace the numbers (IP addresses) that computers use to communicate with servers.

A URL has the following basic format:

protocol://domain-name.top-level-domain/path

Eg: http://support.google.com/google-ads

Above URLis made up of a **domain** name ("google"), a domain category also known as top level domain (".com"), and sometimes other elements like a sub-domain ("support") and path ("/google-ads").

The protocol indicates how a browser should retrieve information about a resource. The protocol is `http:`, but it may also include words like `mailto:` (to open your mail) or `ftp:` (to handle file transfers) or `https:` (the "s" stands for "secure")

The domain name (or hostname) is the human-readable name of the specific location where a resource (in most cases, a website) is located. Domain names are used in URLs to identify particular Web servers. Domain Name Resolution is the process of getting corresponding IP address from a domain name.

Think of the top-level domain (TLD) as something of a category for websites. While we are likely familiar with .com for commercial sites, there is also .edu for educational sites, .gov for governmental sites and many more. Some domain names are location based also. For e.g. au for Australia, in for India etc.

URLs may also contain things like the specific files, folders and subfolders that are on a given website.

Hyper Text Transfer Protocol (HTTP) is a protocol used for transferring hypertext (i.e. text, graphic, image, sound, video etc.) between two computers and is particularly used on the World Wide Web. It is a TCP/IP based communication protocol and provides a standard for Web browsers and servers to communicate.

Applications of Internet

There are many applications and services available on the Internet. But originally, Internet was mainly used for obtaining textual information. Few applications of Internet are:

WWW

World Wide Web is an application of Internet. WWW is the universe of the information available on the internet. It can be defined as a hypertext information retrieval system on the Internet. It allows

us to access any document (hypertext) on the Internet through a naming system based on URLs. Tim Berners-Lee invented the World Wide Web in 1989.

WWW consists of web pages, which use HTML to interchange information on the internet. All the webpages on WWW use HTTP

Email

Electronic mail is sending and receiving of text messages using Internet. Simple Mail Transfer Protocol (SMTP) allows transmission of email over the Internet. Other types of documents and files can also be sent using attachments. Examples of Email : Gmail, Yahoomail, Rediffmail, etc.

Chat

It is another popular application of Internet. Online textual talk in real time is known as Chatting. It is a real time informal communication over the Internet. MSN Messenger, Yahoo Messenger, etc. were widely used in India for chatting.

VoIP

Voice over Internet Protocol is a protocol which enables the transfer of voice using Internet connection. By using VOIP software, phone calls can be done using standard Internet connection. This method of making phone calls is much cheaper than convectional way.

Webpage

Webpage is an electronic document designed using HTML. It displays information in textual or graphical form. It may also contain downloadable data files, audio files or video files. Traversal from one webpage to another web page is possible through hyperlinks. HTML stands for Hyper Text Markup Language used to create webpages. A web page can be classified into two types:

Static web page

A web page which displays same kind of information whenever a user visits it, is known as a static web page. A static web page generally has.htm or .html as extension.

Dynamic web page

An interactive web page is a dynamic webpage. A dynamic web page uses scripting languages to display changing content on the web page. Such a page generally has .php, .asp," or .jsp as extension.

Website

Related webpages from a single own domain is termed as a website. A website has multiple webpages providing information about a particular entity. The web page that is the starting page and mostly acts as an indexed page is known as home page of the website. Each website has a unique address i.e., URL. Eg. https://www.cbse.nic.in

Web Server

A Web Server is a computer (or a group of computers) that stores web pages on the Internet. It works on client/server model. It delivers the requested web page to web browser. Web servers use special programs such as Apache or IIS to deliver web pages over the http protocol. A single web server may support multiple websites.

Hosting of a Website

Web hosting is the process of uploading/saving the web content on a web server to make it available on WWW. In case an individual or a company wants to make its website available on the internet, it should be hosted on a web server. A single website may be hosted on several linked servers.

Web Browser

Web browser is software program to navigate the web pages on the internet. A bowser interprets the coding language of the web page and displays the text and graphics. A web browser allows anyone to access the web without even knowing commands used in software languages to design a web page.

Internet works on client-server model. A web browser is a client which requests the information from the web server. The web server sends the information back to the client. The web address of the webpage written on the address bar tells the web browser which page to access.

Each server has a unique IP address and domain name. In order to access a webpage, the user writes the URL of the website on the address bar of the browser. The machine on which the browser is running (also known as Client machine) sends a request to the IP address of the machine running the web server for that page. Once the web server receives that request, it sends the page content back to the IP address of the computer asking for it. The web browser then translates that content into all of the text, pictures, links, videos, etc.

Commonly used browsers

Internet Explorer (Microsoft)

Mozilla Firefox

Google Chrome

Opera

Safari (Apple)

Browser Settings

Browser settings allow us to change the default appearance and behavior of the browser. If we want our web browser to behave differently, we have to change it's settings. Different options are there in every browser to change the browser settings. Some of the important browser settings are enabling or disabling JavaScript and Cookies, privacy settings, search engine preferences, autofill and

autocomplete behavior, homepage, default language, font size and more. We can also reset our web browser to its original settings.

Add-ons

Add-ons are tools which integrate into our browser. They're similar to regular apps or programs, but only run when the browser runs. One of the most exciting things about modern web browsers is the ability to install browser add-ons into our web browser to give our web browser new or improved functionality. There are many add-ons like block ads & trackers, improve the user interface on popular websites, add gesture features, use powerful password managers, cookie management, etc. Add-ons are also known as extensions. Extensions are usually free and are very easy to install and remove. Sometimes they are installed with other third party software or app. We can enable or disable the add-ons using browser settings.

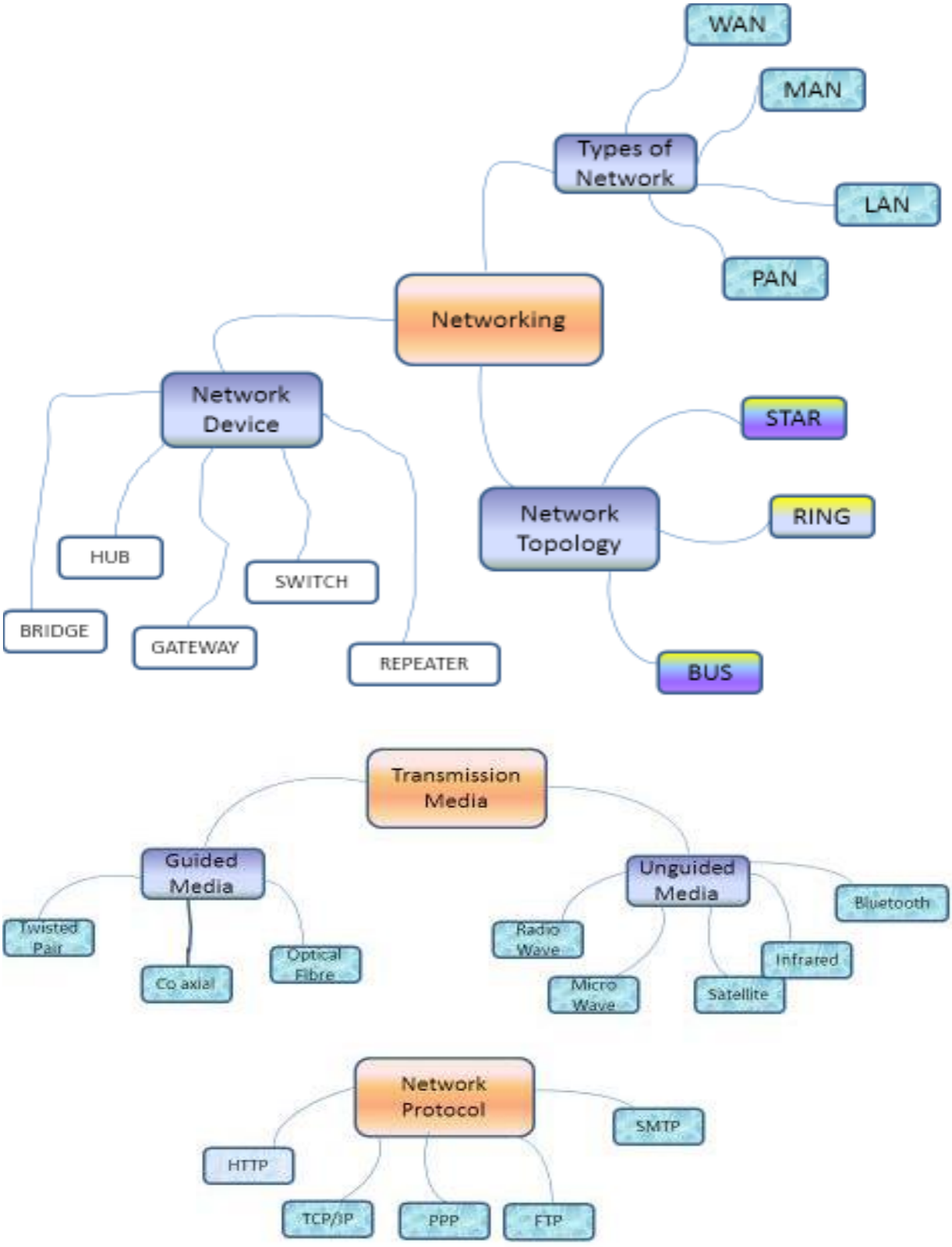
Plug-ins

Web Browser Plug-ins (different to Add-ons/Extensions which are described above) used to be very popular on the internet. What they do is provide a way for web developers to add advanced functionality to websites through separate software modules. They were required years ago because web browsers only offered basic functionality. Years ago web browsers lacked the functionality to play videos or games natively - it was necessary to install a plugin like Flash Player or Java to add the features to be able to do this. Examples of plug-ins include Adobe Flash Player, Java SE, QuickTime, etc. However in recent years, web browsers have lots more functionality built directly in to them, and so the need for plugins to add new functionality is almost zero.

Cookies

Cookies are messages that a web server sends to a web browser so that the web server can keep track of the user's activity on a specific website. Cookies have few parameters name, value, expiration date. Some cookies last only until the browser is closed. They are not stored on our hard drive. They are usually used to track the pages that we visit so that information can be customized for you for that visit. On the other hand, some cookies are stored on our hard drive until we delete them or they reach their expiry date. These may, for example, be used to remember our preferences when we use the website. Cookies can be managed and deleted using browser settings.

Computer Networks



(Multiple Choice Question)

1. Which network device is known as an intelligent hub?
i.Hub
ii.Switch
iii.Bridge
iv.Client

2. A computer network created by connecting the computers of a school campus lab is an example of
i. LAN
ii. MAN
iii. WAN
iv. PAN

3. Which device is used to regenerate the signals over long distance data transmission?
i. Switch
ii. Modem
iii. Repeater
iv. None of the above

4. An online activity that enables us to publish website or web application on the internet
i. Web server
ii. Web Browser
iii. Web Hosting
iv. None

5. Website stores the browsing activity through:
i. web page
ii. Cookies
iii. passwords
iv. server

6. Which protocol is responsible for transferring file over the Internet.
i.FTP
ii.SMTP
iii.TCP
iv.POP

7. Firefox is an example of _____.
i. Web Page
ii. Web server
iii. Website
iv. Web Browser

8. Which network type has the smallest geographic coverage?
i.PAN
ii.LAN
iii.MAN
iv.WAN

9. What is the purpose of a web server in hosting a website?
i. To store the website's images and videos
ii. To display advertisements on the website
iii. To process and respond to user requests for webpages
iv. To secure the website's domain name

10. The device used to connect two networks using different protocols is:
i. Router
ii. Repeater
iii. Gateway
iv. Modem

(Assertion Reasoning based Question)

11. **Assertion(A)** : Incognito browsing opens up a version of the browser that will track your activity
Reasoning(R) : Incognito browsing is useful when entering sensitive data
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

12. Assertion (A): In a star topology, if center device fails, it can affect the entire network.
Reason (R): Star topologies provide redundancy to prevent network failures.
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.

13. Assertion (A): A modem is a device that connects a computer to the Internet.
Reason (R): A modem is responsible for modulating and demodulating digital data fortransmission over analog lines.

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.

14. **Assertion**(A): VoIP stands for Voice over Internet Protocol.
Reason (R): It is a technology that allows you to make voice calls using a broadband internet connection in stead of a regular phone line.

15. Assertion (A): Web servers are responsible for hosting websites.
Reason (R): Websites and webpages are the different in anture.
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.

Q. No.	Ans
1	ii
2	i
3	iii
4	iii
5	ii
6	i
7	iv
8	i
9	iii
10	iii
11	d
12	c
13	a
14	a
15	b

Short Type Question(

1. **Suresh, a Class X student, has just started understanding the basics of Internet and web technologies. He is bit confused in between the terms "World Wide Web" and "Internet" . Help him in understanding both the terms with the help of suitable examples of each.**

   Ans: World Wide Web is a set of programs, standards and protocols that allows the multimedia and hypertext files to be created, displayed and linked on the Internet. Eg: www.microsoft.com, www.amazon.com etc.

   Internet is a computer-based worldwide communications network, which is composed

   of large number of smaller interconnected networks.

   Eg: Web, E-mails, Social media etc.

   While internet is a collection of computers or networking devices connected together; WWW is a collection of documents, linked via special links called hyperlinks. WWW forms a large part of Internet but is not the Internet.

2. **Mahesh, a Class X student, has just started understanding the basics of Internet and web technologies. He is bit confused in between the terms " Website' and 'Webpage' . Help him in understanding both the terms with the help of suitable examples of each.**

   Ans: Website: Website is a collection of web pages displayed on web with a web browser. It contains more than one webpages.

   Webpage: It is a part of website that includes information and content and is displayed on the browser to user. It is a single document display on browser

3. **Yukta, a Class X student, has just started understanding the basics of Internet and web technologies. She is bit confused about the term 'web servers'. Help her in understanding the terms along with the utility of web servers.**
   Ans: A web server is a computer or a group of computers that hosts or stores content of website.

   It processes and delivers web pages of the websites to the users.

   The main job of a web server is to display the website content.

   A web server provides four major functions:

(i) Serving web pages
(ii) Running gateway programs and returning output (iii) Controlling access to the server.
Monitoring and logging server access statistics.

4. **Nitin is a bit confused between the term URL and Domain Name. Help him in understanding both the terms with the help of suitable explanation using an example.**

Ans:

URL	Domain Name
It stands for Unifom Resource locator.	It is a website address.
It is the complete address of a website on the internet.	It is the address we give on browser's search bar to directly access your website
e.g.www.no2jaipur.com/index.html	e.g. cbse.nic.in

5. **Nirmal is a bit confused between the terms Web server and Web browsers. Help him in understanding both the terms with the help of suitable example. Ans**:

Web Server	Web Bowser
A web server is a computer or a group of computers that hosts or stores content of website. It processes and delivers web pages of the websites to the users. The main job of a web server is to display the website content	A web browser is an application used to access and view websites. Common web browsers include Microsoft Internet Explorer, Google Chrome etc.

6. **Neetu is a bit confused between the terms Website and Web hosting. Help her in understanding both the terms with the help of suitable example.**

Ans:

Website	Web Hosting
A collection of webpages which are grouped together and usually connected together in various ways is called a website. It is a group of web pages, containing text, images and all types of multimedia files.	Web hosting is the process of uploading/ saving the web content on a web server to make it available on WWW (World Wide Web). In case an individual or a company wants to make its website available on the internet, it should be hosted on a web server.

7. **Raman wants to develop a website for his garments business. He has to acquire information on website and various components of a website. Help him to understand about website and its components.**

Ans: Website is a group of web pages, containing text, images and all types of multi- media files.

Components of Website are:

Web host, URL, Home page, Design, Web page with content, Navigation Structure.

8. **Priyanka is a web developer but is a bit confused between Add-ons and Plug-ins that are used by web browser. Help her to understand the above two terms along with method to install them.** Ans:

Add-ons	Plug-ins
It is either a hardware unit that is added to a computer to increase the capabitilies or a program unit that enhances primary program. Examples include card for sound, graphic acceleration, modem capability. Software add-ons are common games, word-processing and accounting program.	It is a software component that adds a specific feature to an existing computer program. When a program supports plug-ins, it enables customization. They are commonly used in internet browsers but also can be utilized in numerous other types of applications.

9**. Identify the following device:**

(i) A device that is used to connect different types of dissimiliar networks. It performs the necessary translation so that the connected network can communicate properly?

(ii) A device that regenerates (amplifies) the received signal and retransmits it to its destination.

Ans: (i) Router

(iii) Repeater

10. **How is it easier to diagnose fault in Star topology than in Bus topology?**
Ans: Fault diagnosis is easier in Star topology as if there is any problem in a node will affect the particular node only. While in bus topology, if problem exists in common medium it will affect the entire nodes.

11. **A school with 20 stand-alone computers is considering networking them together and adding a server. State 2 advantages of doing this.**
Ans: Resource sharing, less cost

12. **How is hub different from switch while they both are used for connecting devices in a network?**
Ans:

Hub - is an electronic device that connects several nodes to form a network and redirects the received information to all the connected nodes in broadcast mode
Switch - It has the same function as that of a hub: to connect multiple computers/devices in a network. But, it is an intelligent device. It redirects the received information only to the intended node(s).

13. **Given the below URL: https://cbseacademic.nic.in/SQP_CLASSXII_2024-25.html Identify the following:**

i. Protocol
ii. Host name
iii. Domain name
iv. Domain type
v. File path
vi. File name

Ans: Protocol – https

Host name – www

Domain name – cbseacademic.nic.in

Domain type – in

File path - https://cbseacademic.nic.in/SQP_CLASSXII_2021-22.html

File name - SQP_CLASSXII_2024-25.html

14. **Expand the following abbreviations**:

(i) HTTP (ii) MODEM (iii) WWW (iv) TCP/IP

Ans: (i)Hyper Text Transfer Protocol (ii) Modulator Demodulator

(iii) World Wide Web (iv) Transmission Control Protocol/Internet Protocol

Application Based Question

1. Mangalam Infotech wants to set up their computer network in the Bangalore based campus having four buildings. Each block has a number of computers that are required to be connected for ease of communication, resource sharing and data security. You are required to suggest the best answers to the questions i) to v) keeping in mind the building layout on the campus.

Number of Computers.

Block	**Number of computers**
Development	100
HR	120
Admin	200
Logistics	110

Distance Between the various blocks

Block	Distance
Development to HR	50m
Development to Admin	75m
Development to Logistics	120m
HR to Admin	110m
HR to Logistics	50m
Admin to Logistics	140m

i) Suggest the most appropriate block to host the Server. Also justify your choice.

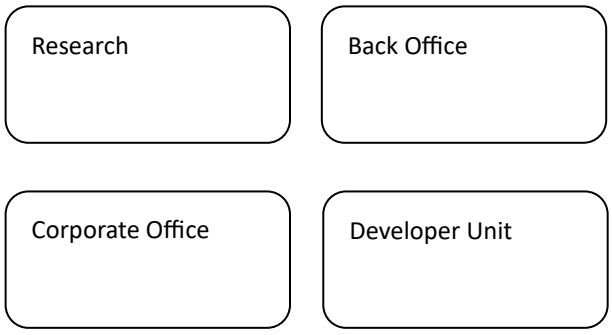
ii) Suggest the device that should should be placed in the Server building so that they can connect to Internet Service Provider to avail Internet Services.

iii) Suggest the wired medium and draw the cable block to block layout to economically connect the various blocks.

iv) Suggest the placement of Switches and Repeaters in the network with justification.

v) Which protocol will be used to perform video conferencing across the four buildings?

2. A company has 4 departments of buildings as shown in the diagram :



Distances between various Buildings:

Research to Back Office - 50m

Back Office to Developer Unit - 60m

Developer Unit to Corporate Office - 25m

Corporate Office to Research - 170m

Research to Developer Unit - 125m

Back Office to Corporate office - 90m

Number of computers in each of the department:

Back Office - 150

Developer Unit - 15

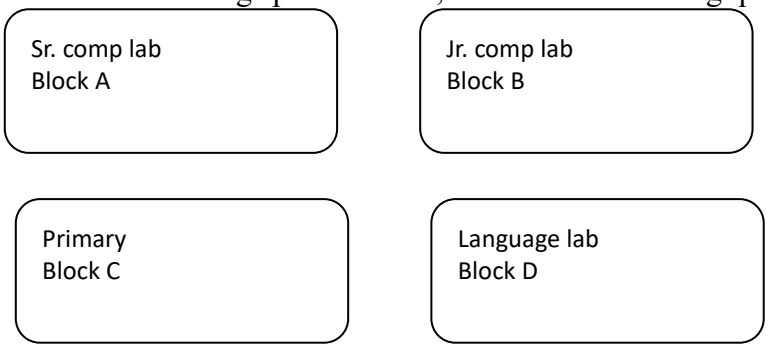
Research -15

Corporate Office – 25

As a network expert, provide the best possible answer for the following queries:

i. Suggest a most suitable cable layout for the above connections.
ii. Suggest the most appropriate topology of the connection between the departments. iii. Suggest the most suitable place (.e. buildings) to house the server of this organization. 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 New Delhi with the offices in hilly areas. Suggest a way to connect it economically.

3. Based on the following specifications, answer the following questions:



You have given to create a network in your school building. It has 4 blocks of buildings.

Distance between the various blocks is as follows:

A to B - 50 m

A to C - 60 m

A to D - 110m

D to B - 60m

D to C - 100m

C to A - 70m

Numbers of computers in each block

Block A - 20

Block D - 50

Block B - 15

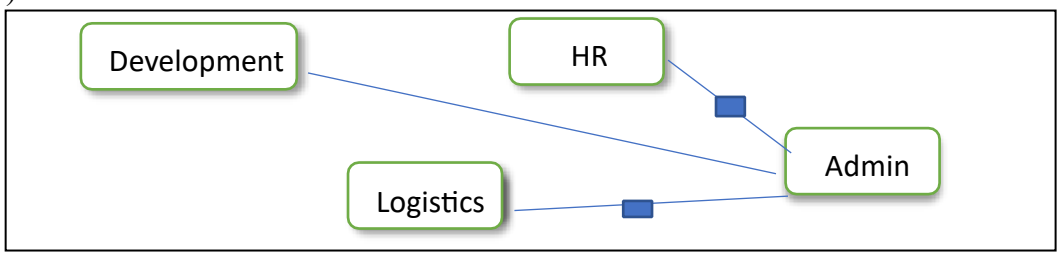
Block C– 30

i. Out of LAN, WAN and MAN, what type of network will be formed if we interconnect different computers of the campus?
ii. Suggest the topology which should be used to efficiently connect the various blocks of school building.
iii. Suggest a network device to connect all computers in each building.
iv. The School wants internet accessibility in all the blocks. Suggest a suitable technology.
v. Which protocol is used to send emails across various labs?

Answers: -

1.

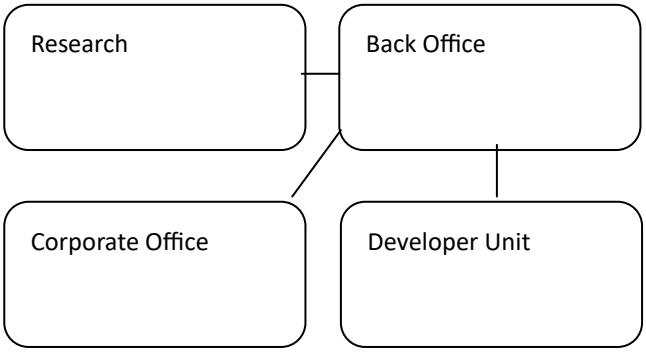
i) Admin Block since it has maximum number of computers.
ii) Modem should be placed in the Server building i.e. Admin block.
iii) The wired medium is UTP/STP cables.



iv) Switches in all the blocks since the computers need to be connected to the network. Repeaters between Admin and HR block & Admin and Logistics block. The reason being the distance is more than 100m.
v) VOIP

2.

i.



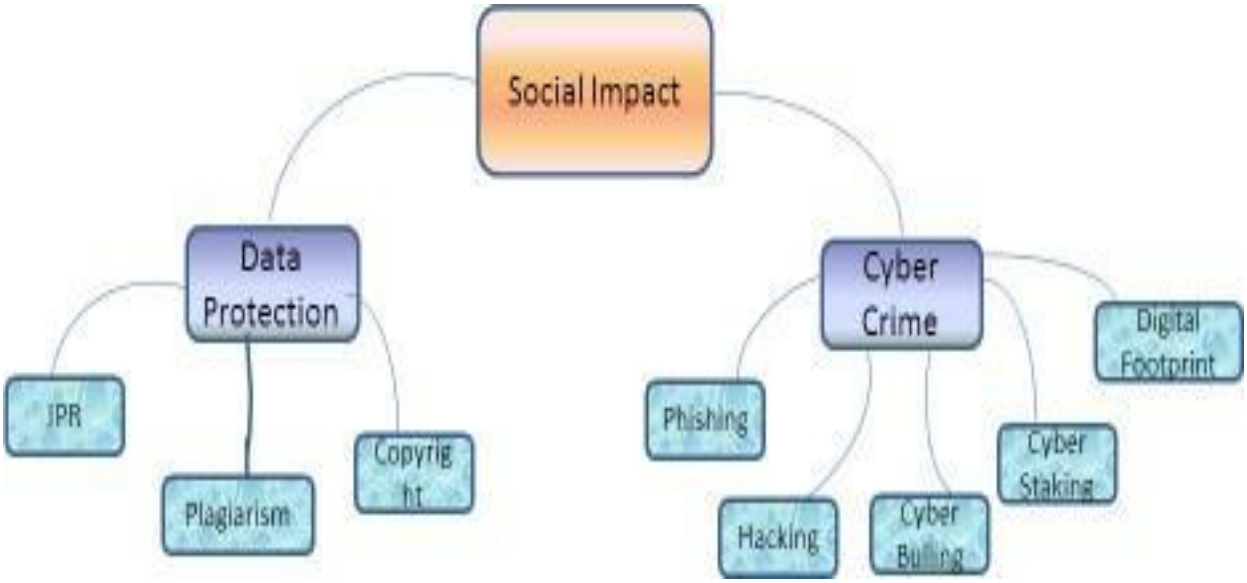
ii. Star Topology
iii. Back office
iv. a. Not required. Repeaters may be skipped as per above layout (because distance is less than 100 m)
b. In every wing

v. Radio Waves

3. i. LAN
ii. Star
iii. Switch is used to connect multiple computers.
iv. Broadband connection
v. SMTP

UNIT-4

SOCIETAL IMPACTS



DIGITAL FOOTPRINT

A digital footprint refers to the trail of data and information that individuals leave behind as they interact with digital platforms, devices, and services. This footprint is created through various online activities such as browsing websites, posting on social media, sending emails, making online purchases, and using digital services. Essentially, it encompasses all the traces of one's online presence and interactions.

Digital footprints can be categorized into two major types based on the nature of the online activities and the information they encompass.

1. ACTIVE FOOTPRINTS

   These are intentional actions taken by individuals online, such as posting on social media, sending emails, making online purchases, or participating in online discussions.

SOME EXAMPLES INCLUDE:

- Social Media Posts
- Online Comments and Interactions
- Email Communications
- Online Purchases
- Content Creation and Sharing
- Online Reviews and Ratings
- Educational Activities
- Political Activism
- Gaming and Entertainment

2. PASSIVE FOOTPRINTS
   These are traces left behind without direct user interaction, often generated automatically by digital devices and services. Examples include website cookies, IP addresses logged by servers, and metadata embedded in digital files.

   SOME EXAMPLES INCLUDE:

- Cookies and Tracking Mechanisms:
- IP Addresses:
- Metadata in Digital Files
- Device Usage Data
- Search Engine Queries
- Social Media Tracking
- Social media platforms track user interactions, such as likes, shares, and clicks, to provide personalized content and targeted advertising. This data can also be used to analyze user behavior and trends.
- Online Advertisements
- Location Services
- Website Analytics

NET AND COMMUNICATION ETIQUETTES

Netiquette is a made-up word from the words net and etiquette. Netiquette thus describes the rules of conduct for respectful and appropriate communication on the internet. Netiquette is often referred to as etiquette for the internet. These are not legally binding rules, but recommended rules of etiquette.

Some common net etiquette for youngsters is:

1. Children on the internet should not out personal information. In these times of social media, identity theft and social engineering, keeping personal information secret is essential! Under no circumstances should your child share passwords or personal information such as their name, address or telephone number online. The name of the school or clubs should also be kept secret.

2. Do not trust chat participants. Children should always approach strangers with a healthy skepticism. You never know who is really hiding behind the funny profile name and picture. For example, you should never meet a stranger just because they got along well in a chat conversation. It could be an adult with bad intentions.

3. Hate speech on the internet is an increasing problem, especially in social media. It is often found in offensive comments under photos or posts. If you come across such statements on the internet, you should report them to the provider of the website. Often you will find the option to report a post directly underneath it on social media. The providers are legally obliged to delete content which is evidently illegal within 24 hours.

Communication etiquette encompasses the unwritten rules and conventions that govern our interactions, ensuring clarity, respect, and efficiency in exchanges. In our interconnected world, where messages traverse the globe in milliseconds, mastering these etiquettes is beneficial and essential.

Some common communication etiquette for youngsters is:

1. Use appropriate tone and style for different audiences and purposes.
2. Be polite and respectful and avoid offensive or abusive language.
3. Be honest and truthful and avoid plagiarism or misinformation.
4. Acknowledge the source of any information or idea that you use or quote.

DATA PROTECTION

Data protection is the process of safeguarding important data from corruption, compromise or loss and providing the capability to restore the data to a functional state should something happen to render the data inaccessible or unusable.

INTELLECTUAL PROPERTY RIGHTS (IPR)

IPR provide certain exclusive rights to the inventors or creators of that property, in order to enable them to reap commercial benefits from their creative efforts or reputation. There are several types of intellectual property protection like patent, copyright, trademark, etc.

A patent protects new inventions, processes, or scientific creations, a trademark protects brands, logos, and slogans, and a copyright protects original works of authorship

PLAGIARISM

Plagiarism involves taking ideas or other forms of intellectual effort and passing them off as one's.A specific example of plagiarism is using a program found in a textbook as your solution to a programming assignment, i.e., without mention of the original author and source of the program.

LICENSING AND COPYRIGHT

It typically provide end users with the right to make one or more copies of the software without violating copyrights. It also defines the responsibilities of the parties entering into the license agreement and may impose restrictions on how the software can be used.

FREE AND OPEN SOURCE SOFTWARE (FOSS)

FOSS promotes sharing, collaboration, community engagement, transparency, and the ability to customize software for individual or organizational needs. Some well-known examples of FOSS include the Linux operating system, the Apache HTTP Server, and the Mozilla Firefox web browser.

Example of Free and Open source software

• As Operating system – linux,Ubuntu

•As dbms – mysql,mongodb,SQlite

• As Programming language – java,php,python

• As internet browser/webserver – chromium,firefox/ apache http server,apache tomcat

CYBERCRIME AND CYBER LAWS

In Simple way we can say that cyber crime is unlawful acts wherein the computer is either a tool or a target or both. Cyber crimes can involve criminal activities that are traditional in nature, such as theft, fraud, forgery, defamation and mischief, all of which are subject to the Indian Penal Code.

Some common cybercrimes :

1. Phishing and Scam:

Phishing is a type of social engineering attack that targets the user and tricks them by sending fake messages and emails to get sensitive information about the user or trying to download malicious software and exploit it on the target system.

2. Identity Theft

Identity theft occurs when a cybercriminal uses another person's personal data like credit card numbers or personal pictures without their permission to commit a fraud or a crime.

3. Ransomware Attack

Ransomware attacks are a very common type of cybercrime. It is a type of malware that has the capability to prevent users from accessing all of their personal data on the system by encrypting them and then asking for a ransom in order to give access to the encrypted data.

4. Hacking

This term refers to the crime of unauthorized access to private computers or networks and misuse of it either by shutting it down or tampering with the data stored or other illegal approaches.

5. Internet Fraud

Internet fraud is a type of cybercrimes that makes use of the internet and it can be considered a general term that groups all of the crimes that happen over the internet like spam, banking frauds, theft of service, etc.

6. Cyber Bullying

It is also known as online or internet bullying. It includes sending or sharing harmful and humiliating content about someone else which causes embarrassment and can be a reason for the occurrence of psychological problems. It became very common lately, especially among teenagers.

7. Cyber Stalking

Cyberstalking can be defined as unwanted persistent content from someone targeting other individuals online with the aim of controlling and intimidating like unwanted continued calls and messages.

Cyber law, also known as internet law or digital law, signifies the legal regulations and frameworks governing digital activities. It covers a large range of issues, including online communication, e-commerce, digital privacy, and the prevention and prosecution of cybercrimes.

Types of Cyber Law

- **Privacy Laws:**

Privacy laws focus on protecting individuals' personal information from unauthorized access and use. They establish guidelines for the responsible handling of personal data by organizations, ensuring individuals' privacy rights are upheld.

- **Cybercrime Laws:**

Cybercrime laws define and penalize various cybercrimes, ensuring legal consequences for offenders. These laws play a crucial role in deterring individuals from engaging in illegal online activities and provide a legal framework for prosecuting cybercriminals.

- **Intellectual Property Laws:**

Intellectual property laws in the digital domain protect patents, copyrights, and trademarks from unauthorized use. They provide a legal foundation for creators and innovators to protect their digital assets.

- ## E-commerce Laws:

E-commerce laws regulate online business transactions, defining rules for contracts, transactions, and consumer protection. These laws contribute to the establishment of a secure and fair online marketplace.

HACKING AND PHISHING

While hacking often targets systems or networks, phishing primarily targets individuals. However, it's worth noting that these two methods can be used together. For instance, a hacker could use a phishing attack to obtain an individual's login credentials and then use these to hack into a system or network.

CYBER BULLYING

Cyberbullying includes sending, posting, or sharing negative, harmful, false, or mean content about someone else. It can include sharing personal or private information about someone else causing embarrassment or humiliation.

An example of "cyberbullying" is: Constantly instant messaging rude comments to a classmate, Uploading embarrassing pictures of friends at school without their permission, Spreading rumors about kids at school using e-mail

OVERVIEW OF INDIAN IT ACT

The Information Technology Act, 2000 (also known as ITA-2000, or the IT Act) is an Act of the Indian Parliament (No 21 of 2000) notified on 17 October 2000. It is the primary law in India dealing with cybercrime and electronic commerce. The primary objectives of the IT Act, 2000 are: Granting legal recognition to all transactions done through electronic data exchange, other means of electronic communication or e-commerce in place of the earlier paper-based communication.

E-WASTE: HAZARDS AND MANAGEMENT

- **DEFINITION AND IMPORTANCE OF E-WASTE**

Electronic waste (e-waste), is a generic term used to describe all types of old, end-of-life or discarded electrical and electronic equipment, such as household appliances; office information and communications equipment; entertainment and consumer electronic equipment; lighting equipment; electric and electronic tools.

The recycling of e-waste serves a lot of useful purposes. For instance, include protecting human and environmental health by keeping those devices out of landfills. Or recovering the parts within the devices that still have value, and providing manufacturers with recycled metals that can be used to make new products.

E-WASTE TYPES:

E-WASTE HAZARDS:

E-waste contains multiple known and suspected neurotoxicants, including lead and mercury that may disrupt the development of the central nervous system during pregnancy, infancy, childhood and adolescence. Some harmful toxicants from e-waste may also impact the structural development and function of the lungs.

E-waste management includes the following activities:

- Collection of E-Waste
- Sorting of E-Waste
- Processing of E-Waste
- Repairing of E-Waste
- Recycling
- Dismantling
- Component Recovery from E-Wast e
- Residual Disposal of E-Waste

Organizations/networks working on e-waste issues in India:

- Knowledge bank for e-waste management in India
- The E-waste Guide, India
- National Solid Waste Association of India (NSWAI) etc…

AWARENESS ABOUT HEALTH CONCERNS RELATED TO THE USAGE OF TECHNOLOGY

If we spend extended time in front of the electronic gadgets, we could be at an increased risk of developing certain health problems, including the following:

1. Musculoskeletal issues which involve pain in areas of your body such as your back, neck and shoulders. These troubles may occur because of poor posture when using the computer.
2. Computers produce bright lights, glare and flickering images that can cause eye strain. Those who use computers report a high prevalence of computer vision syndrome, also called digital eye strain.
3. Repetitive stress injuries are injuries to muscles and tendons due to repetitive motions. Repetitive stress injuries are common in the hands, wrists and forearms because of computer and keyboard use.
4. Headaches are common and may occur because of increased muscle tension while working at a computer
5. Prolonged use of technology throughout the day may lead to a sedentary lifestyle lacking adequate physical activity. Obesity is a costly and serious chronic disease that can lead to death. The Centers for Disease Control and Prevention (CDC) recommends that adults move more and sit less. Combat the time you spend sitting at work by taking frequent breaks to move around.
6. A computer or cell phone's artificial light can trick your brain and suppress the release of melatonin, the substance that assists your sleeping patterns. If you struggle with not feeling sleepy at night, refrain from using a computer right before going to bed.

MCQ (1 MARK EACH)

1. 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.
d) All of the above

2. Soham has invented a new theory in Micro Biology.He wants to protect it against illegeal use.He should take its

a) Patent
b) Trademark
c) Copyright
d) None

3. Rajiv's continuous online classes and increasing use of computers made his mother worried about his health.Which of the following points should not be suggested to his mother to take care of:

a) Sit in right posture.
b) Take some break and walk
c) Keep the gadget above your height
d) Periodically rotate and watering eyes.

4. Swarna has prepared a document on cyber security and for this she
(i) Downloaded an image and pasted in document with some editing
(ii) Copied a phrase from website and rephrased it and used in document.Which of the above activity is an act of plagiarism?
   a) Action (i)
   b) Action (i) and (ii)
   c) None of the above
   d) **Both of the above**
5. Out of the following, which crime(s) will come under cyber crimecategory ?
a) Identity theft
b) Invasion of privacy
c) Online harassment
d) All of the above

6. E-waste is harmful to the environment and human health if not properly treated or disposed of, therefore they must be handled with care. What are the health hazards which can be caused by E-waste ?
a) Lung cancer
b) DNA damage
c) Brain damag
d) All of the above

7. Which of the following doesn't come under IPR Violation?
a) Copyright infringement
b) Plagiarism
c) Illegal download
d) Phishing

8. Which of the following operating system is not an open source software?
a) Linux
b) Ubuntu
c) Macintosh
d) All the above

9. Read following statements:
(i) Trademark is a document that provides legally binding guidelines for the use and distribution of software.
(ii) Hacking is the act of unauthorized access to a computer, computer network or any digital system.
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

10. Read following statements:
(i) Digital footprint is nothing but the record of what a person do online.
(ii) Patents are automatically granted to creators & authors.
a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

2 MARKS 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 cyber crime? Justify your answer.

Ans: **Identity theft** – As he used someone's account and sent inflammatory email messages.

2. You got the below shown SMS from your bank querying a recent transaction. Answer the following —

a) Will you SMS your pin number to the given contact number?

Ans: No, we should not provide any confidential information like pin number or password to anyone.

b) Will you call the bank helpline number to recheck the validity of the SMS received?
Ans: If it is required then otherwise its not necessary.

3. State whether True or False :
i. A copyright is automatically granted to authors or creators of content. ___True_____
ii. In FOSS source code is usually hidden from the users. ____False_____

4. Mention any four net etiquettes.
Ans. Four net etiquettes

- No copyright violation
- Share the expertise with others on the internet
- Avoid cyber bullying
- Respect other's privacy and diversity

5. Priyanka is using her internet connection to book a flight ticket. This is a classic example of leaving a trail of web activities carried by her. What do we call this type of activity? What is the risk involved by such kind of activity?
Ans: We call this type of activity as Digital Footprints.
Risk involved :It includes websites we visit emails we send, and any information we submit online, etc., along with the computer's IP address, location, and other device specific details. Such data could be used for targeted advertisement or could alsobe misused or exploited

3 MARKS QUESTIONS

1. Roshni has recently shifted to a new city and school. She does not know many people in her new city and school. But all of a sudden, someone is posting negative, demeaning comments on her social networking profile etc. She is also getting repeated mails from unknown people. Every time she goes online, she finds someone chasing her online.
   i. What is this happening to Roshni?
   ii. What immediate action should she take to handle it?
   iii. Is there any law in India to handle such issues? Discuss briefly.

   Ans.i.Roshni 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.

2. The school offers Wi-Fi to the students of Class XII. For communication, the network security-staff of the school is having a registered URL "techschool.org". On 30 April 2024, emails were received by all the students regarding expiry of their passwords. Instructions were also given renew their password within 24 hours by clicking on particular URL provided. On the bases of the above case study, answer the questions given below:
   i. Specify which type of cybercrime is it.
   a) Spamming
   b) Phishing
   c) Identity Theft
   d) Hacking
   Answer: (b) Phishing

   ii. URL stands for_____
   a) Universal Resource Loader
   b) Uniform Resource Locator
   c) United Research Loader
   d) Uniform Resource Loader
   Answer: (b) Uniform Resource Locator

   iii. Unsolicited commercial email is known as:
   a) Malware
   b) Virus
   c) Spam
   d) Spyware
   Answer: (c) Spam

3. Describe measures to recycle your e-waste safely.
   Ans:

- Use a certified e-waste recycler-
- Visit Civic Institutions-Check with local government, schools and universities for additonal responsible recycling options. Encourage your neighbors tojoin you and spread the word about educated e-waste disposal.
- Explore retail options-Best buy or other stores with an effective recycling program can be approached.
- Donate your electronics-Reuse is always better than recycling. Share your technology with people who wouldn't otherwise have access to it.

4. List any three health hazards related to excessive use of Technology.
   Ans. The continuous use of devices like smart phones, computer desktop, laptops, headphones etc cause a lot of health hazards if not addressed. These are:

- Impact on bones and joints: wrong posture or long hours of sitting in an uncomfortableposition can cause muscle or bone injury.
- Impact on hearing: using headphones or earphones for a prolonged time and on highvolume can cause hearing problems and in severe cases hearing impairments.
- Impact on eyes: This is the most common form of health hazard as prolonged hours ofscreen time can lead to extreme strain in the eyes.

5. Kishan wanted to gift his friend a football or a wrist watch. So he searched for manysports items and wrist watch online. But after that everytime he goes online, his web browser shows him advertisements about sports items and wrist watches.
   a) Why is this happening?
   b) How could have Kishan avoided them?
   c) Wat is a super cookie?

   Ans:

a) This is happening because third party cookies saved his search preference andnow websites are posting advertisements based on his preferences.
b) Kishan could have avoided this by privately browsing i.e., opening the webbrowser in incognito mode before searching for such things.
c) A super cookie is a cookie meant to be stored on a user's computer indefinitely. Super cookies cannot be removed in the same way that regular cookies can, making them more challenging for users to recognize and eliminate.

SAMPLE QUESTION PAPER-1

Class: XII

SUBJECT: INFORMATICS PRACTICES (065)

TIME: 03:00 HRS. **MM: 70**

General Instructions:

1. This question paper contains five sections, Section A to E.
2. All questions are compulsory.
3. Section A has 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 02 questions carrying 04 marks each.
7. Section E has 03 questions carrying 05 marks each.
8. All programming questions are to be answered using Python Language only.

SECTION – A

1. Which of the following covers a geographical area like a city or town? 1
   (a) LAN
   (b) MAN
   (c) WAN
   (d) PAN

2. State TRUE or FALSE against the following statement – 1
   "Cyber-laws are incorporated for punishing all criminals only."

3. GPL stands for _____ 1
   (a) General Public License
   (b) GNU General Private License
   (c) GNU General Public License
   (d) GNU Public License

4. Which of the following is not an aggregate function of MySQL? 1
   (a) AVG()
   (b) SUM()
   (c) ADD()
   (c) MIN()

5. If column "per" contains the data set (97.5, 56.2, 75.6, 56.2, 75.6), what will be the output after the execution of the given query? 1
   SELECT AVG(DISTINCT Fees) FROM student;
   (a) 76.43
   (b) 76.34
   (C) 67.43

(d) 67.34

6. Which of the following is an example of e-waste? 1
(a) empty soda can
(b) Old cloths
(c) an old computer
(d) a ripened banana

7. Which SQL statement do we use to find out the total number of records present in the table SALES? 1
(a) SELECT * FROM SALES;
(b) SELECT COUNT (*) FROM SALES;
(c) SELECT FIND (*) FROM SALES;
(d) SELECT SUM () FROM SALES;

8. Which clause is used with "aggregate functions"? 1
(a) GROUP BY
(b) SELECT
(c) WHERE
(d) Both (a) and (b)

9. Which one of the following functions is used to find the smallest value from the given data in MySQL? 1
(a) MINIMUM( )
(b) MIN( )
(c) SHORT( )
(d) SMALL( )

10. To create an empty Series object, you can use: 1
(a) pd.Series(empty)
(b) pd.Series( )
(c) pd.Series(np.NaN)
(d) all of these

11. To display last five rows of a Series object S, you may write – 1
(a) tail( )
(b) tail(5)
(c) None of a and b
(d) a and b both

12. Which of the following can be used to specify the data while creating a DataFrame? 1

(a) Dictionaries
(b) Series
(c) ndarrays
(d) All of the above

13. Online textual talk is called _____? 1
(a) Video Conference
(b) Chat
(c) Text Phone
(c) Telephony

14. Stealing someone else's intellectual work and representing it as own, is called _____. 1
(a) Intellectual steal
(b) Plagiarism
(c) Pluckism
(d) Pickism

15. Write output of the following MySQL command – 1
SELECT SUBSTRING("Informatics Practices",6,9);
(a) matics Pr
(b) atics Pra
(c) matics Pra
(d) None

16. What is meant by the term 'cyber crime'? 1
(a) Any crime that uses computer to jeopardize or attempt to jeopardize national security
(b) The use of computer network to commit financial or identity fraud
(c) The theft of digital information
(d) Any crime that involves computer and networks

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)**: Digital footprint 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.

Reason(R): While online, all of us need to be aware of how to conduct ourselves, how best to relate with others and what ethics, morals and values to maintain.

1

18. **Assertion (A) : P**andas is an open source Python library which offers high performance, easy-to-use data structures and data analysis tools.
Reason (R) : Professionals and developers are using the pandas library in data science 1 and machine learning.

SECTION – B

19. Explain the terms Web Site and Web Server. OR 2
Mention any four networking goals.

20. Mr. Vinay wanted to display average salary of each Category. He encountered an 2 error while entered the following SQL query. Identify error(s) and Rewrite the correct SQL statement.
SELECT Category, Salary FROM Hotel GROUP BY Category;

21. Distinguish between Single Row and Aggregate functions of MySQL. Write one example of each. 2

22. Write a program in to create a series 'Emp' using a dictionary having Employee name 2 as key and salary as value with following data –

Employee Name	Salary
Ashok	10000
Ravi	7500
Dinesh	12500
Akram	8000

23. List any four health hazards related to excessive use of Technology. 2

OR List any four benefits of e-waste management.

24. What will be the output of the following code: 2

```
import pandas as pd
M=[15,-10,56,39,-
90,15]
p=pd.Series(M)
print(p[0])
print(p[[0,3,4]])
```

25. Carefully observe the following code: 2

```
import pandas as pd
Y1={'Qtr1':500,'Qtr2':600,'Qtr3':120,'Qtr4':
1800}  Y2={'A' :130,'B':160,'C':150}
totSales={1:Y1,2:Y2}
df=pd.DataFrame(totSales)  print(df)
```

Answer the following:

i. List the index of the DataFrame df

ii. List the column names of DataFrame df.

SECTION – C

26. Write outputs for SQL queries (i) to (iii) which are based on the given table EMPLOYEE: 3

TABLE: EMPLOYEE

EMPNO	NAME	DOJ	SALARY	CITY
5001	SUMIT SINGH	2012-05-24	55000	JAIPUR
5002	ASHOK SHARMA	2015-10-25	65000	DELHI
5003	VIJAY SINGH	2009-09-09	85000	JAIPUR
5004	RAKESH VERMA	2020-12-21	60000	AGRA
5006	RAMESH KUMAR	2011-01-22	72000	DELHI

i. SELECT LENGTH(NAME) FROM EMPLOYEE WHERE SALARY>75000; ii. SELECT NAME FROM EMPLOYEE WHERE MONTH(DOJ)=12;

iii. SELECT MOD(SALARY, DAY(DOJ)) FROM EMPLOYEE WHERE CITY= 'JAIPUR';

27. Write a Python code to create a DataFrame with appropriate column headings from the list given below: 3

[['P101','COMPUTER',50000],['P222','TABLE',5000],[P201','MOUSE',1000]]

28. Consider the given DataFrame 'Student': 3

	Name	Percent
0	Naina	75.5
1	Rehana	82.6

2	Karina	62.8
3	Sandeep	55.4

Write suitable Python statements for the following:

i. Add a column called grade with the following data: ['B1','A2','C2','D1']. ii. Add a new Student named 'Krishna' having Percent 80.5.

iii. Remove the column grade.

29. Namita has recently shifted to new city and new school. She does not know many 3 people in her new city and school. But all of a student, someone is posting negative, demeaning comments on her social networking profile, school site's forum etc. She is also getting repeated mails from unknown people. Every time she goes online, she finds someone chasing her online.

i. What is this happening to Namita?
ii. What immediate action should she take to handle it?
iii. Is there any law in India to handle such issues? Discuss briefly.

30. Based on table VEHICLE given here, write suitable SQL queries for the following: 3

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

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 each ypes of vehicles.

OR

Discuss the significance of Group by clause in detail with the help of suitable example.

SECTION – D

31. Neha creates a table FURNITURE with a set of records to maintain the records of 4 furniture purchased by her. She has entered the 7 records in the table. Help her to find the answers of following questions:-

TABLE : FURNITURE

FID	NAME	DATEOFPURCHASE	COST	DISCOUNT
B001	Double Bed	03-Jan-2018	45000	10
T010	Dining Table	10-Mar-2020	51000	12
B004	Single Bed	19-Jul-2021	22000	10
C003	Long Back Chair 6	30-Dec-2020	12000	10
T006	Console Table	17-Nov-2019	15000	12
B006	Bunk Bed	01-Jan-2021	28000	13

i. Write a query to display Furniture name in upper case. ii.

Write a query to display the highest cost of the furniture.

iii. Write a query to count total number of furniture having discount more than 10. OR

(Option for part iii only)

Write a query to count year wise total number of furniture purchased.

32. Mr. Sharma, a data analyst has designed the df that contains data about Cyber Olympiad details with 'Cyb1', 'Cyb2', 'Cyb3', 'Cyb4', 'Cyb5' as indexes shown below. Answer the following questions: 4

	School	Total_students	Topper	Runnerup
Cyb1	KVS	50	46	4
Cyb2	NVS	45	35	10
Cyb3	DPS	30	20	10
Cyb4	MPS	25	18	7
Cyb5	GPS	37	28	9
Cyb6	BPS	33	25	8

A. Predict the output of the following –

i.

df.shape

ii. df.[2:4]

B. Write python statement to display the data of the topper column of index Cyb2 to Cyb5.

OR

Write Python statement to compute and display the difference of data of Total_students column and Runnerup column of the above given DataFrame.

SECTION – E

33. Write suitable SQL query for the following: 5

i. Display 7 characters extracted from 7th left character onwards from the string 'INFORMATICS PRACTICES'.

ii. Display the position of occurrence of string 'COME' in the string 'WELCOME WORLD'.

iii. Round off the value 2334.78 to one decimal place. iv. Display the remainder of 200 divided by 7.

v. Remove all the expected leading and trailing spaces from a column userid of the table 'USERS'.

OR

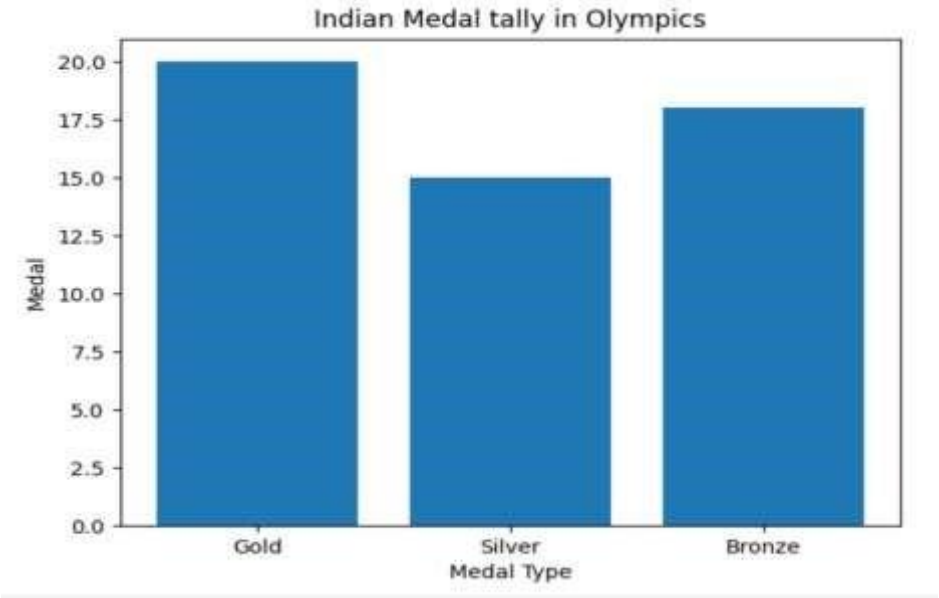
Explain the following SQL functions using suitable

examples. i. UCASE() ii. TRIM() iii. MID()

iv. DAYNAME()

v. POWER()

34. Write Python code to plot a bar chart for India's medal tally as shown below: 5

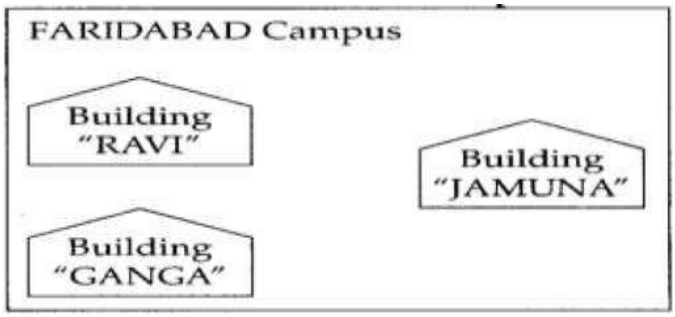


Also give suitable python statement to save this chart.

OR

Write a python program to plot a bar chart based on the given data to depict the changing weekly average temperature in Guwahati for five weeks. Week=[1,2,3,4,5] temp=[25,29.27.30,33]

35. Granuda Consultants are setting up a secured network for their office campus at 5 Faridabad for their day to day office and web-based activities. They are planning to have connectivity between 3 building and the head office situated in Kolkata. Answer the questions (i) to (iv) after going through the building positions in the campus and other details, which are given below:



Distances between various buildings:

Building "RAVI" to Building "JAMUNA"	120 m
Building "RAVI" to Building "GANGA"	50 m
Building "GANGA" to Building "JAMUNA"	65 m
Faridabad Campus to Head Office	1460 km

Number of Computers:

Building "RAVI"	25
Building "JAMUNA"	150
Building "GANGA"	51
Head Office	10

(i) Suggest the most suitable place (i.e., block) to house the server of this organization. Also give a reason to justify your suggested location.

(ii) Suggest a cable layout of connections between the buildings inside the campus.

(iii) Suggest the placement of the following devices with justification:
(a) Repeater
(b) Switch/hub

(iv) The organization is planning to provide a high-speed link with its head office situated in the KOLKATA using a wired connection. Which of the following cable will be most suitable for this job?
- Optical Fibre
- Co-axial Cable
- Ethernet Cable

(v) Which of the following will you suggest to establish the online face to face communication between the people in the ADMIN office of Faridabad campus and Kolkata head office? a) Cable TV
b) Email
c) Video conferencing
d) Text chat

Sample Paper Marking Scheme

1.	(b) MAN	1
2.	FALSE	1
3.	(a) General Public License	1
4.	(c) ADD()	1
5.	(a) 76.43	1
6.	(c) an old computer	1
7.	(b) SELECT COUNT (*) FROM SALES;	1
8.	(a) GROUP BY	1
9.	(b) MIN( )	1
10.	(b) pd.Series( )	1
11.	(d) a and b both	1
12.	(d) All of the above	1
13.	(b) Chat	1
14.	(b) Plagiarism	1
15.	(a) matics Pr	1
16.	(d) Any crime that involves computer and networks	1
17.	(b) Both A and R are true and R is not the correct explanation for A	1
18.	(a) Both A and R are true and R is the correct explanation for A	1
19.	**Web Site:** A collection of web pages related through hyperlinks, and saved on a web server is known as web site. website in general contains information organized in multiple pages about an organization. **Web Server** : Used to store and deliver the contents of a website to clients such as a browser that request it. A web server can be software or hardware. The server needs to be connected to the Internet so that its contents can be made accessible to others *(1 mark for each correct explanation of each term)* OR Four networking goals are: i. Resource sharing ii. Reliability iii. Cost effective iv. Fast data sharing (½ mark for each goal)	2
20.	Mr. Vinay missed the aggregate function in the query. The function he needs to write is avg(salary). The correct statement is: SELECT Category, AVG(Salary) FROM Hotel GROUP BY Category;	2

21.	***Single row functions:*** It operates on a single row It displays result per row It can be used within select, where and order by clause	2

	Examples: math, string, date etc. Aggregate functions : It operates on multiple rows It displays one result for set of rows It can be used only in select clause Examples: min, max, avg, sum etc. (1 mark for difference and 1 mark for example of each)	
22.	Emp={'Ashok' :10000, 'Ravi' :7500 , 'Dinesh' :12500, 'Akram' :8000} S1=pd.Series(Emp) (1 mark for each correct statement)	2
23.	i. Bad Posture, Back Aches, Neck and Shoulder Strain ii. Pain in Wrists – Carpal Tunnel Syndrome iii. Eye Problem iv. Impact on bones and Joints v. Sleep Issues vi. Mental Health Issues (or any valid answer) (2 mark for any four correct options) OR i. Saves the environment and natural resources ii. Allows for recovery of precious metals iii. Protects public health and water quality iv. Saves landfill space (1/2 mark for each correct option)	2
24.	15 0 15 3 39 4 -90 (½ marks for each correct output line)	2
25.	i. The index labels of df will include Qtr1,Qtr2,Qtr3,Qtr4,A,B,C ii. The column names of df will be: 1,2 (1 mark for each correct answer)	2
26.	i. 11 ii. RAKESH VERMA iii. 16 4 (1 mark for each correct answer)	3

27.	import pandas as pd d=[['P101','COMPUTER',50000],['P222','TABLE',5000],[P201','MOUSE',1000]] df=pd.DataFrame(d,columns=['ProdID','PName','Price']) (1 mark for each correct python statement)	3
28.	i. Student['grade']= ['B1','A2','C2','D1'] ii. Student.loc['4']=['Krishna',80.5] iii. Student=Student.drop('grade',axis=1) (1 mark for each correct statement)	2+1

29.	i. Namita has become a victim of cyber bullying and cyber stalking. ii. She must immediately bring it into the notice of her parents and school authorities. And she must report this cyber crime to local police with the help of her parents. iii. Yes. The Information Technology Act, 2000 (also known as ITA-2000, or the IT Act) is the primary law in India dealing with cybercrime and electronic commerce. (1 mark for each correct answer)	3
30.	a. select avg(price),type from vehicle group by type having qty>20; b. select count(type) from vehicle group by company; c. select sum(price) from vehicle group by type; (1 mark for each correct query) OR GROUP BY clause is used in a SELECT statement in combination with aggregate functions to group the result based on distinct values in a column. To Display the average price of each type of vehicle having quantity more than 20. We need to group the records based on the type and then find average price using avg() function.	3

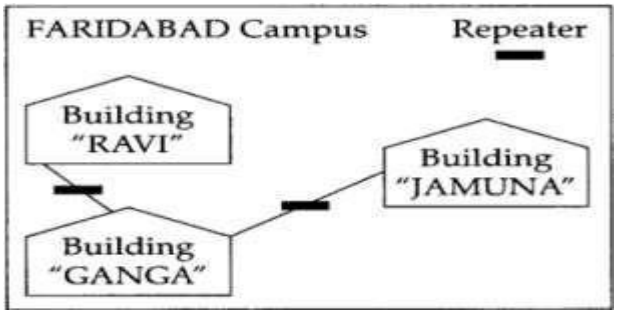
V_no	Type	Company	Price	Qty
AW125	Wagon	Maruti	250000	25
J0083	Jeep	Mahindra	4000000	15
S9090	SUV	Mitsubishi	2500000	18
M0892	Mini van	Datsun	1500000	26
W9760	SUV	Maruti	2500000	18
R2409	Mini van	Mahindra	350000	15

select avg(price),type from vehicle group by type having qty>20;
(1mark for correct significance & 2 mark for correct example

31.	i. SELECT UPPER(NAME) FROM Furniture;
	ii. SELECT MAX(COST) FROM FURNITURE;
	(1 mark for each correct query)
	iii. SELECT COUNT(*) FROM FURNITURE GROUP BY DISCOUNT HAVING DISCOUNT=10;
	OR
	SELECT YEAR(DOP),COUNT(*) FROM FURNITURE GROUP BY YEAR(DATEOFPURCHASE);
	(2 marks for correct query)
		1+1+2

32.	A. Output: i. (5,4) ii. School tot_students Topper Runnerup Cyb2 GPS 20 18 2 Cyb4 MPS 18 10 8 1 mark for each correct output B. Python statement: print(df.loc['Cyb2': 'Cyb5', 'Topper']) OR print(df.Total_students-df.Runnerup) 2 marks for correct Python statement	1+1+2

33.	i. select mid(INFORMATICS PRACTICES',7,7); ii. select INSTR('WELCOME WORLD','COME'); iii. select round(2334.78,1); iv. select mod(200,7);
	v. select trim(userid) from users;
	1 mark for each correct query
	
	OR
	
	1. UCASE(): It converts the string into upper case.
	Example:
	SELECT UCASE('welcome world'); Output:
	WELCOME WORLD
	2. TRIM(): It removes the leading and trailing spaces from the given string.
	Example:
	SELECT TRIM(' Welcome world '); Output:
	Welcome world
	3. MID(): It extracts the specified number of characters from given string.
	Example:
	SELECT MID(' Welcome world,4,,4); Output:
	Come
	4. DAYNAME(): It returns the weekday name for a given date Example:
	SELECT DAYNAME('2022-07-22');
	Output: Friday
		5

	5. POWER(): It returns the value of a number raised to the power of another number. Example: SELECT POW(6,2); Output: 36 ½ mark for each correct explanation ½ mark for each correct example	
34.	import matplotlib.pyplot as plt Category=['Gold','Silver','Bronze'] Medal=[20,15,18] plt.bar(Category,Medal) plt.ylabel('Medal') plt.xlabel('Medal Type') plt.title('Indian Medal tally in Olympics') plt.show() (½ mark for each correct statement) Python statement to save the chart: plt.savefig("aa.jpg") (1 mark for the correct statement) OR import matplotlib.pyplot as plt Week=[1,2,3,4,5] temp=[25,29.27.30,33] plt.bar(Week, temp) plt.show() (1 mark for each correct statement)	5
35.	i. The most suitable place to install server is building "JAMUNA" because this building has maximum computer which reduce the communication delay. ii. Cable layout. (Bus topology).  iii. (a) Since the cabling distance between buildings GANGA and JAMUNA are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes. (b) In the layout a switch each would be needed in all the building, to interconnect the group of cables from the different computers in each building. iv. Optical fiber v. Video conferencing (1 mark for the correct Answer)	5

SAMPLE PAPER-2

CLASS XII

INFORMATICS PRACTICES (065)

TIME: 3 HOURS **M.M.70**

General Instructions:

1. This question paper contains five sections, Section A to E.
2. All questions are compulsory.
3. Section A have 18 questions carrying 01 mark each.
4. Section B has 07 Very Short Answer type questions carrying 02 marks each.
5. Section C has 05 Short Answer type questions carrying 03 marks each.
6. Section D has 03 Long Answer type questions carrying 05 marks each.
7. Section E has 02 questions carrying 04 marks each. One internal choice is given in Q35 against part c only.
8. All programming questions are to be answered using Python Language only.

	PART A	
1.	A network which covers a city / district is called: i. LAN ii. WAN iii. MAN iv. Internet	1
2.	Digital footprints are stored _____. i. Temporarily for few days ii. Permanently iii. For 7 days only iv. For 3 days only	1
3.	Online posting of rumors, giving threats online, posting the victim's personal information, comments aimed to publicly ridicule a victim is termed as _____. i. Cyber Insult ii. Cyber Crime iii. Cyber Bullying iv. All of the above	1
4.	What will be returned by the given query? **SELECT INSTR('INDIA' , 'DI');** i. 2 ii. 3 iii. -2 iv. -3	1

5.	If column **"Price"** contains the data set (3000,8000,4500,5000,3000, 7000), what will be the output after the execution of the given query? **SELECT COUNT (DISTINCT Price) FROM student;** i. 3 ii. 4 iii. 5 iv. 6	1
6.	**IPR** stands for: i. Indian Property Right ii. Intellectual property right iii. Intelligent property right iv. Intellectual Property resource	1
7.	Which SQL statement do we use to display the records present in the table ORDERS in the descending order of their bill amount? i. SELECT * FROM ORDERS GROUP BY BILL_AMOUNT ASC; ii. SELECT * FROM ORDERS HAVING BILL_AMOUNT DESC; iii. SELECT * FROM ORDERS ORDER BY BILL_AMOUNT; iv. SELECT * FROM ORDERS ORDER BY BILL_AMOUNT DESC;	1
8.	Which one of the following is an aggregate function? i. ROUND() ii. LENGTH() iii. MIN() iv. NOW()	1
9.	Which one of the following SQL Clause is used to put condition on group of data in MySQL? i. WHERE ii. ORDER BY iii. HAVING iv. None of the above	1
10.	When we create a series from dictionary then the keys of dictionary become: **(i)** Index of series **(ii)** Values of series **(iii)** Caption of series (iv) Columns of series	1

11.	Which of the following statement will execute without an error? i. Import pandas as pd ii. import matplotlib.Pyplot as plt iii. import panda as pd iv. import matplotlib.pyplot as pl	1
12.	The following code create a dataframe named df with _____ rows. import pandas as pd L = [{'jan':100, 'feb':200},{'jan':300, 'feb':200, 'mar':400}] df = pd.DataFrame(L) i. 1 ii. 2 iii. 3 iv. 4	1
13.	_____ networking device is known as an intelligent hub. i. Switch ii. Hub iii. Router iv. Gateway	1
14.	In SQL, which function is used to display all letters in CAPITAL? i. Upper( ) ii. Ucase( ) iii. Both i and ii iv. LCASE()	1
15.	The _____ include right to copy (reproduce) a work, right to distribute copies of the work to the public, and right to publicly display or perform the work: i. Copyright ii. Createright iii. GPL iv. Makeright	1
16.	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. i. Cyber Crime ii. Computer Virus iii. Program iv. Software	1
Q17 and 18 are ASSERTION AND REASONING based questions. Mark the correct choice as i. Both A and R are true and R is the correct explanation for A ii. Both A and R are true and R is not the correct explanation for A iii. A is True but R is False iv. A is false but R is True		

17.	**Assertion (A): -** The repeater is a device that amplifies the network over geographical distance. **Reasoning (R):-** A hub is a device which is used to connect more than one device in the network.	1
18.	**Assertion (A):-** For a given dataframe 'df' of shape (3,3) when we are assigning values using following code – df.column1 = [10,20,30,40] Python gives error. **Reasoning (R): -** While assigning values to a column of dataframe, then sequence contained values must have values equal to number of rows in dataframe.	1
	PART B	
19.	**Differentiate between Web Page and Website.** **OR** **What is Star Topology? Explain with diagram.**	2
20.	**Seema, a database administrator needs to display stream wise average marks of 'Humanities' and 'Commerce' stream. She is encountering an error while executing the following query:** **SELECT STREAM, AVG (MARKS) FROM STUDENT GROUP BY STREAM WHERE STREAM='Humanities' OR STREAM= 'Commerce';** **Help her in identifying the reason of the error and write the correct query by suggesting the possible correction (s).**	2
21.	**What is the purpose of Group By clause in SQL? Explain with the help of suitable example.**	2
22.	**Write a program to create a series object using a list that stores the marks of four students in IP subject.** **Note: Assume four student names are Ram, Naresh, Suresh and Seema having 48, 52, 69, 38 respectively and pandas library has been imported as pd.**	2
23.	**Write down two ways to reduce the risk of identity theft.** **OR** **What do you understand by Cyber Stalking?**	2

24. **What will be the output of the following code:** 2

```
>>>import pandas as pd
>>>A=pd.Series(data=[15,25,65,10,20])
>>>print(A<=20)
```

25. **Consider the below given data frame df –** 2

	COL1	COL2
P	10	20
Q	20	40
R	30	60

Write python code for the following:

i. **Add A new row S with elements 40, 80**

ii. **Delete column COL2 from dataframe df.**

SECTION C

26. **Write outputs for SQL queries (i) to (iii) which are based on the given table STUDENT:** 3

TABLE: STUDENT

ADMNO	NAME	CLASS	DOA	MARKS
1001	Sam	10	25-12-2000	96
1002	Sunil	12	20-09-1998	80
1003	Seema	11	17-08-2000	86
1004	Tarun	10	25-03-2002	68

i. **SELECT LOWER(NAME) FROM STUDENT WHERE MARKS BETWEEN 80 AND 90;**

ii. **SELECT NAME FROM STUDENT WHERE MONTH(DOA)=8;**

iii. **SELECT SUM (MARKS) FROM STUDENT WHERE CLASS= 10;**

27. Consider the following dataframe df1 as shown below : 3

	Col1	Col2	Col3	Res
T1	62.89	100.0	60.00	True
T2	94.73	100.0	59.22	True
T3	49.09	100.0	46.04	False
T4	38.48	85.4	58.60	False

What will be the output produced by following statements:-

a. print(df1.loc [:, 'Col3' :])

b. print(df1.iloc[2: , : 3])

c. print(df1.iloc [1:3 , 2:3])

28. Consider x is a list object whereas y is a Series object. Both have values 20, 40,90, 110. [3]

What will be the output of the following two statements considering that the above objects have been created already
a. print (x*2)
b. print(y*2)
Justify your answer.

29. A. Identify the type of cybercrime for the following situations: [3]
(i) A person complains that Rs. 4.25 lacs have been fraudulently stolen from his/her account online via some online transactions in two days using NET BANKING.

(ii) A person complains that his/her debit/credit card is safe with him still somebody has done shopping /ATM transaction on this card.

(iii) A person complains that somebody has created a fake profile of Facebook and defaming his/her character with abusive comments and pictures.

B. As a citizen of India, what advice you should give to others for e-waste disposal?

OR

Posing as someone else online and using his/her personal / financial information shopping online or posting something is a common type of cyber crime these days.
a. What are such types of cyber crimes collectively called?
b. Write at least 02 measured you should take to stop these?

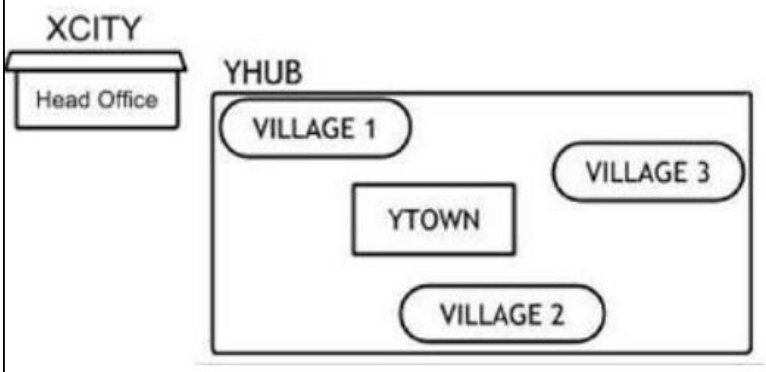
30. Based on table **EMPLOYEES** given here, write suitable SQL queries for the following: [3]

Emp_ID	Name	Gender	City	Salary
1001	Ram	M	Agra	42000
1002	Pravesh	M	Mumbai	45000
1003	Sneha	F	Agra	90000
1004	Preeti	F	Mumbai	38478
1005	Himnashu	M	Delhi	23484
1006	Anchal	F	Dubai	29000
1007	Meena	F	Lucknow	45894
1008	Shyam	M	Lucknow	23483

iv. Display gender wise highest salary.
v. Display city wise lowest salary.
vi. Display total number of male and female employees.

OR

Discuss the significance of the following clauses in detail with the help of suitable example.
1. WHERE CLAUSE
HAVING CLAUSE

	SECTION D	
31.	Write suitable SQL query for the following: i. Display 4 characters extracted from 4th left character onwards from the string 'INFORMATICS PRACTICES'. ii. Display the position of occurrence of string 'ON' in the string 'PYTHON PROGRAMMING'. iii. Round off the value 446.723 to two decimal place. iv. Display the result of 4 raised to 5. v. Remove all the expected leading spaces from a column employeeid of the table **'EMPLOYEES'**. **OR** Explain the following SQL functions using suitable examples. i. LCASE() ii. RTRIM() iii. INSTR() iv. MONTHNAME() v. ROUND()	5
32.	Intelligent Hub India is a knowledge community aimed to uplift the standard of skills and knowledge in the society. It is planning to setup its training centers in multiple towns and villages pan India with its head offices in the nearest cities. They have created a model of their network with a city, a town and 3 villages as follows. As a network consultant, you have to suggest the best network related solutions for their issues/problems raised in (i) to (v), keeping in mind the distances between various locations and other given parameters.  Shortest distances between various locations:	5

VILLAGE 1 to YTOWN	2 KM
VILLAGE 2 to YTOWN	1.5 KM
VILLAGE 3 to YTOWN	3 KM
VILLAGE 1 to YTOWN 2	3.5 KM
VILLAGE 1 to YTOWN 3	4.5 KM
VILLAGE 1 to YTOWN 3	3.5 KM
CITY Head Office to YHUB	30 KM

Number of Computers installed at various locations are as follows:

YTOWN	100
VILLAGE 1	10
VILLAGE 2	15
VILLAGE 3	15
CITY OFFICE	5

In Villages, there are community centers, in which one room has been given as training center to this organization to install computers. The organization has got financial support from the government and top IT companies.

i. Suggest the most appropriate location of the SERVER in the YHUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer.

ii. Suggest the topology and draw the cable layout (location to location) to efficiently connect various locations within the YHUB.

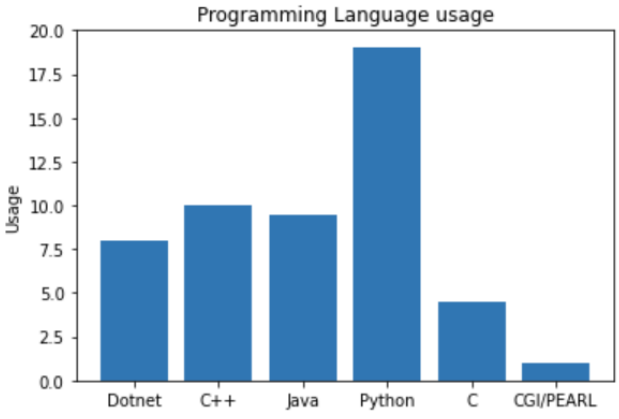
iii. Which hardware device will you suggest to connect all the computers within each location of YHUB?

iv. Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at YHUB locations?

v. Suggest the placement of a Repeater in the network with justification.

33.	Write Python code to plot a bar chart for Programming Language usage 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 number of dengue patients in Mumbai for five weeks.

Week=[1,2,3,4,5]
Number_of_patients=[2000,2300,3550,4500,6000]

SECTION E

34. Shweta, a database administrator has designed a database for a footwear shop. Help her by writing answers to the following questions based on the given table: 1X4

TABLE: Client

Cust_ID	Cust_Name	Address	Phone_no	City
C007	Pritam Sharma	12,M.G Road	71274250	Bangalore
C008	Sutopa	14/1 Pritam Pura		Delhi
C010	Anurag Basu	15A, Park Road	61281921	Kolkata
C012	Hrithik	7/2 Vasant Kunj		Delhi
C013	Firoz Shah	2, Servamali road	25014192	Bangalore
C035	Aamina Begum	13/A Versova	41612181	Mumbai

i. Display number of customers city wise.

ii. Count the number of customers who do have not given phone numbers along with their city.

	iii. Display distinct cities from client. iv. Display the details of all customers in descending order of their Cust_Id; **OR (Option for part iv only)** v. Display the names of customers whose names start with 'A' in the table. numbers along with their city. vi. Display distinct cities from client. vii. Display the details of all customers in descending order of their Cust_Id; **OR (Option for part iv only)** Display the names of customers whose names start with 'A' in the table.	
35.	Consider the following DataFrame ResultDF and answer any four questions from (A)- (C) A. Write the correct statement from the given options to display names of all students who got more than 90 marks in Maths. B. Which of the following command will display the row labels of the DataFrame? C. Predict the output of the following python statement: i. ResultDF.shape ii. ResultDF[1:3] **OR (Option for part C only)** Predict the output of the following python statement: i. ResultDF.head(2) ii. ResultDF.tail(3)	1+1+2

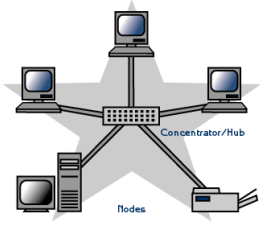
	Arnab	Ramit	Sam	Riya	Mallika
Maths	75	46	74	45	67
Science	67	34	56	67	43
English	66	45	55	63	70
Hindi	67	56	76	33	45
SocSc	59	44	36	72	44

MARKING SCHEME

CLASS XII

INFORMATICS PRACTICES (065)

TIME: 3 HOURS **M.M.70**

<table>
<tr><td></td><td colspan="2">PART A</td><td></td></tr>
<tr><td>1.</td><td colspan="2">iii. MAN</td><td>1</td></tr>
<tr><td>2.</td><td colspan="2">ii. Permanently</td><td>1</td></tr>
<tr><td>3.</td><td colspan="2">iii. Cyber Bullying</td><td>1</td></tr>
<tr><td>4.</td><td colspan="2">ii. 3</td><td>1</td></tr>
<tr><td>5.</td><td colspan="2">iii. 5</td><td>1</td></tr>
<tr><td>6.</td><td colspan="2">ii. Intellectual property right</td><td>1</td></tr>
<tr><td>7.</td><td colspan="2">iv. SELECT * FROM ORDERS ORDER BY BILL_AMOUNT DESC;</td><td>1</td></tr>
<tr><td>8.</td><td colspan="2">iii. MIN()</td><td>1</td></tr>
<tr><td>9.</td><td colspan="2">iii. HAVING</td><td>1</td></tr>
<tr><td>10.</td><td colspan="2">i. Index of series</td><td>1</td></tr>
<tr><td>11.</td><td colspan="2">iv. import matplotlib.pyplot as pl</td><td>1</td></tr>
<tr><td>12.</td><td colspan="2">ii. 2</td><td>1</td></tr>
<tr><td>13.</td><td colspan="2">i. Switch</td><td>1</td></tr>
<tr><td>14.</td><td colspan="2">iii. Both i and ii</td><td>1</td></tr>
<tr><td>15.</td><td colspan="2">i. Copyright</td><td>1</td></tr>
<tr><td>16.</td><td colspan="2">ii. Computer Virus</td><td>1</td></tr>
<tr><td>17.</td><td colspan="2">ii. Both A and R are true and R is not the correct explanation for A</td><td>1</td></tr>
<tr><td>18.</td><td colspan="2">i. Both A and R are true and R is the correct explanation for A</td><td>1</td></tr>
<tr><td></td><td colspan="2">PART B</td><td></td></tr>
<tr><td>19.</td><td colspan="2">
<table>
<tr><th>Webpage</th><th>Website</th></tr>
<tr><td>An individual hypertext document linked under a website.</td><td>A collection of multiple webpages hosted on a server.</td></tr>
<tr><td>Example: Contact us page, About us page</td><td>Example: flipkart.com, amazon.com</td></tr>
</table>
1 Mark for any other suitable difference each.
OR
Star topology is a network topology in which each network component is physically connected to a central node such as a router, hub or switch. In a star topology, the central hub acts like a server and the connecting nodes act like clients.
 

</td><td>2</td></tr>
<tr><td>20.</td><td colspan="2">The problem with the given SQL query is that WHERE clause should not be</td><td>2</td></tr>
</table>

	used with Group By clause. To correct the error, HAVING clause should be used instead of WHERE. Corrected Query: SELECT STREAM, AVG(MARKS) FROM STUDENT GROUP BY STREAM HAVING STREAM= 'Humanities' OR HOUSE='Commerce'; 1 Mark for error identification 1 Mark for writing correct query	
21.	1 Mark for correct explanation of GROUP BY Clause 1 Mark for writing suitable example	2
22.	ipmarks = [48,52,69,38] s = pd.Series(ipmarks, index = ['Ram' , 'Naresh' , 'Suresh' , 'Seema']) 1 marks for each correct python statement.	2
23.	Two ways to reduce the risk of identity theft – 1. Use unique IDs to protect your devices and accounts. 2. Using biometric protection. 1 marks each for any other correct way of reducing risk of identity theft. OR Cyber stalking refers to online stalking where someone uses internet, chat rooms, social networking sites, emails etc. to stalk his/her victim. Cyber stalker follows the victim online everywhere and keeps posting/ sending something which is unsolicited.	2
24.	3	2
25.	i. df.loc['S'] = [40,80] ii. df.drop('COL1', inplace = True, axis = 1) or del df['COL1'] or df.pop('COL1')	2
	SECTION C	

26. iv.

LOWER(NAME)
sunil
seema

v.

NAME
Seema

vi.

SUM (MARKS)
164

3

27. a.

	Column3	Res
T1	60.00	True
T2	59.22	True
T3	46.04	False
T4	58.62	False

b.

	Column1	Column2	Column3
T3	49.09	100.0	46.04
T4	38.48	85.4	58.62

c.

	Column3
T2	59.22
T3	46.04

1 mark for each correct output.

3

28. a. will give the output as:
[20,40,90,110,20,40,90,110]
b. will give the output as

0 40
1 80
2 180
3 220

Justification: In the first statement x represents a list so when a list is multiplied by a number, it is replicated that many number of times.
The second y represents a series. When a series is multiplied by

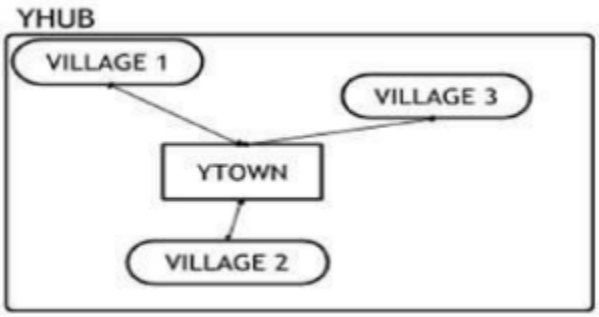
3

	a value, then each element of the series is multiplied by that number. 1 mark for output of list multiplication 1 mark for output of Series multiplication 1 mark for the justification	
29.	A. (i) Cyber Theft/ Bank Fraud (ii) Identity Theft (iii) Cyber Stalking B. As a citizen of India, We can advice the following principle of waste management: Reduce, Reuse and Recycle. OR i. These are collectively known as Online Fraud. ii. The measures to stop these frauds may include: A monitoring official body that ensures the sanctity of Ecommerce Company and delivery of goods / services as promised. Strong security mechanism by the ecommerce site and payment gateways to prevent stealing of crucial information. 1 mark for collective name. 2 marks for any 02 measures.	3

30.	vii. SELECT Gender, MAX(Salary) FROM EMPLOYEES GROUP BY Gender;
	
	viii. SELECT City, MIN(Salary) FROM EMPLOYEES GROUP BY City;
	ix. SELECT Gender, COUNT(*) FROM EMPLOYEES GROUP BY Gender;
	
	1 marks for each correct query
	OR
	
	Discuss the significance of the following clauses in detail with the help of suitable example.
	2. WHERE CLAUSE –
	WHERE Clause in MySQL is a keyword used to specify the exact criteria of data or rows that will be affected by the specified SQL statement. The WHERE clause can be used with SQL statements like INSERT, UPDATE, SELECT, and DELETE to filter records and perform various operations on the data.
	Example – SELECT * FROM STUDENT WHERE MARKS = 90;
	This will show all record of students who are having marks exactly equal to 90.
		3

	3. HAVING CLAUSE – In MYSQL HAVING Clause is used to specify conditions on data grouped using GROUP BY Clause. In MYSQL WHERE can not be used to specify conditions on grouped data. Example – SELECT AVG(MARKS) FROM STUDENT GROUP BY CLASS HAVING AVG(MARKS) >=50; This will show average marks of students class-wise only for those classes where average marks are equal to or greater than 50. 1 marks for explanation and 0.5 mark for example of each clause.	
	SECTION D	

31.	Write suitable SQL query for the following:
	vi. SELECT SUBSTR('INFORMATICS PRACTICES',4,4);
	OR
	SELECT MID('INFORMATICS PRACTICES',4,4);
	vii. SELECT INSTR ('PYTHON PROGRAMMING', 'ON');
	viii. SELECT ROUND(446.723,2);
	ix. SELECT POW(4,5);
	x. SELECT LTRIM(employeeid) FROM EMPLOYEES;
	
	OR
	i. **LCASE()** – It is used to show the entered string in small letters. SELECT LCASE('INDIA'); will give output as **india**.
	ii. **RTRIM()** – This function strips the trailing spaces of the given string. SELECT RTRIM('Informatics Practices '); will give output as Informatics Practices without any trailing spaces.
	iii. **SUBSTR()** – This function returns the substring starting from a position given and no of characters to be returned. SELECT SUBSTR("Welcome", 3,4) will give output as lcom. Here 3 is starting position and 4 number of characters to be returned.
	iv. **MONTHNAME()** – This function returns the name of the month for the entered date. SELECT MONTHNAME("2022-12-11"); will give output as December.
	v. **ROUND()** – This function rounds off the entered number as per the second parameter. SELECT ROUND(34.5678,2); will give output as 34.57
	
	0.5 marks for correct explanation and 0.5 marks for suitable example.
		5

32.	a. YTOWN. Because it has the maximum number of computers and it is closest to all other locations. b. Star Toplogy  c. Switch OR Hub d. Videoconferencing OR VoIP. e. Repeater may be placed when the distance between 2 buildings is more than 70 meter.	
33.	import matplotlib.pyplot as plt Lang=["Dotnet", "C++", "Java", "Python", "C", "CGI/PEARL"] Usage = [8, 10, 9.5, 19, 4.5, 1] plt.bar(Lang, Usage) plt.yticks([0,2.5,5,7.5,10,12.5,15,17.5,20]) plt.ylabel("Usage") plt.title('Programming Language usage') plt.show() plt.savefig('Lang_bar_chart.png') OR import matplotlib.pyplot as plt Week=[1,2,3,4,5] Number_of_patients=[2000,2300,3550,4500, 6000] plt.plot(Week,Number_of_patients) plt.show()	5

SECTION E

34. 1X4

i. Select City, count(*) from Client group by City;
ii. Select City, count(*) from Client where Phone_no IS NULL;
iii. Select DISTINCT(City) from Client;
iv. Select *from Client Order By Cust_ID desc;
OR
Select Cust_Name from Client where Cust_Name LIKE 'A%';

35. 1+1+2

D. print(ResultDF.loc['Maths']>90)

E. print(ResultDF.index)

F. Predict the output of the following python statement:
i. (5,5)
ii.

	Arnab	Ramit	Sam	Riya	Mallika
Science	67	34	56	67	43
English	66	45	55	63	70

OR (Option for part iii only)

i.

	Arnab	Ramit	Sam	Riya	Mallika
Maths	75	46	74	45	67
Science	67	34	56	67	43

ii.

	Arnab	Ramit	Sam	Riya	Mallika
English	66	45	55	63	70
Hindi	67	56	76	33	45
SocSc	59	44	36	72	44

SAMPLE PAPER-3

Class : XII

Subject : Informatics Practices(065)

Maximum Marks : 70 **Time : 3:00 Hrs**

General Instructions:

- **Please check this question paper contains 35 questions.**
- **The paper is divided into 4 Sections- A, B, C, D and E.**
- **Section A, consists of 18 questions (1 to 18). Each question carries 1 Mark.**
- **Section B, consists of 7 questions (19 to 25). Each question carries 2 Marks.**
- **Section C, consists of 5 questions (26 to 30). Each question carries 3 Marks.**
- **Section D, consists of 2 questions (31 to 32). Each question carries 4 Marks.**
- **Section E, consists of 3 questions (33 to 35). Each question carries 5 Marks.**
- **All programming questions are to be answered using Python Language only.**

Q.No.	Question	Marks
	SECTION A	
1	A _____ network is an interconnection among two or more computers or computing devices. (A) Computer (B) Social (C) Mobile (D) Society	**1**
2	When e-waste such as electronic circuit boards are burnt for disposal, the elements contained in them create a harmful chemical called _____which causes skin diseases, allergies and an increased risk of lung cancer. i. Hydrogen ii. Beryllium iii. Chlorine iv. Oxygen	**1**
3	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**
4	In MYSQL database, if a table, EMPLOYEE has degree 5 and cardinality 4, and another table, DEPARTMENT has degree 3 and cardinality 3, what will be the degree and cardinality of the Cartesian product of EMPLOYEE and DEPARTMENT? (A) 5,3 (B) 8,12 (C) 12,8 (D) 4,3	**1**
5	Write the output of the following SQL command. select round(49.88); a. 49.88	**1**

	b. 49.8 c. 49.0 d. 50	
6	'O' in FOSS stands for: i. Outsource ii. Open iii. Original iv. Outstanding	**1**
7	Which function is used to display the total number of records from table in a database? (a) sum(*) (b) total(*) (c) count(*) (d) return(*)	**1**
8	Which of the following is a DDL command? a) SELECT b) ALTER c) INSERT d) UPDATE	**1**
9	Predict the output of the following query: SELECT Lower (MONTHNAME ('2023-03-05')); i. May ii. March iii. may iv. march	**1**
10	A _____ is a one dimensional array (a) Dataframe (b) Series (c) both (a) and (b) (d) None	**1**
11	Which one of the following functions is used to find the largest value from the given data in MySQL? i. MAX( ) ii. MAXIMUM( ) iii. BIG( ) iv. LARGE( )	**1**
12	To get the number of elements in a Series object, attribute may be used. (a) index (b) size (c) itemsize (d) ndim	**1**
13	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**
14	In SQL, write the query to display the list of tables stored in a database.	**1**
15	For web pages where the information is changed frequently, for example, stock prices, weather information which out of the following options would you advise ? a) Static web page b) Dynamic web page Justify your answer.	**1**

16	_____is a non-profit organization that aims to build a publicly accessible global platform where a range of creative and academic work is shared freely. i. Creative Cost ii. Critical Commons iii. Creative Commons iv. Creative Common	**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): - Internet cookies are text files that contain small pieces of data,like a username, password and user's preferences while surfing the internet. Reasoning (R):- To make browsing the Internet faster & easier, its required to store certain information on the server's computer.	**1**
18	Assertion (A):- To use the Pandas library in a Python program, one must import it. Reasoning (R): - The only alias name that can be used with the Pandas library is pd. 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	**1**
	SECTION B	
19	Rati is doing a course in networking. She is unable to understand the concept of URL. Help her by explaining it with the help of suitable example. OR Differentiate between static and dynamic website	**2**
20	The python code written below has syntactical errors. Rewrite the correct code and underline the corrections made. Import Pandas as pd Data=[4,7,8,4] df= Pd.series(data) Print(df)	**2**
21	Consider the given SQL string: "Hey, where are you going" Write suitable SQL queries for the following: i. Returns the position of the first occurrence of the substring "are" in the given string. ii. To extract first seven characters from the string.	**2**
22	Given two series S1 and S2 S1 S2 A 39 A 10 B 41 B 10	**2**

	C 42 D 10 D 44 F 10 Find the output for following python pandas statements? a. S1[: 2]*100 b. S1 * S2	
23	Mention any four net etiquettes.	**2**
24	Fill in the blank to get the output as 71 import pandas as pd s1=pd.Series([10,20,30,40,71,50]) print(s1[_____])	**2**
25	Differentiate between char and varchar.	**2**
	SECTION C	
26	Write output of the following SQL queries on the basis of following table.	**3**

Table : Hospital

PName	Fee	Gender	Dateofvisit
Ramesh	200	M	2020-02-11
Mohnish	250	M	2019-12-22
Muskan	350	F	2019-11-22
Sunil	250	M	2018-12-02
Sonam	null	F	2019-01-19
Sahil	16950	F	2019-02-26

(i) Select right(PName,2) from hospital where pname like ‘M%n’ or pname like ‘%h%’;
(ii) Select left(PName,3) from hospital where dateofvisitbwteen ‘2018-12-01’ and ‘2019-12-01’ and Gender=’M’;
(iii) Select sum(Fee) from hospital where Fee>200 and gender=’F’;

OR

Write the queries for the following:
(i) display gender wise average fees of the patients.
(ii) display gender wise highest fees of the patients.
(iii) display the details of patients in descending order of names.

27 Create the following dataframe using dictionary

	A	B	C
0	1	2	3
1	5	6	8

28 Write MySQL statements for the following: **3**

i. To create a database named STORE.

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

Column Name	Datatype	Constraint
ItemCode	Char(5)	Primary Key
ItemName	Varchar(20)	
Price	Integer	

29 Nadira has recently shifted to a new city and school. She does not know many people in her new city and school. But all of a sudden, someone is posting negative, demeaning comments on her social networking profile etc. She is also getting repeated mails from unknown people. Every time she goes online, she finds someone chasing her online. **3**

i. What is this happening to Nadira?

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

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

OR

Mention any three health issues due to the excess use of mobiles.

30 Consider the dataframe 'DF' as: **3**

	A	B	C
0	1	2	3
1	5	6	8

(i) Write a statement to add new row with values (7,8,9)

(ii) Rename the column 'B' to 'AB'

(iii)Add a new column 'AC' with values (10,11)

SECTION D

31 Consider the table College given below: **4**

Table : College

No	Name	Age	Department	DOJ	Basic	Sex
1	Shalaz	45	Biology	13-02-1988	10500	M
2	Sameera	54	Biology	10-01-1990	9500	F
3	Yagyen	43	Physics	27-02-1998	8500	M
4	Pratyush	34	Mathematics	22-01-1991	8500	M
5	Aren	51	Chemistry	11-01-1993	7500	M

6	Reeta	27	Chemistry	14-02-1994	9000	F
7	Urvashi	29	Biology	10-02-1993	8500	F
8	Teena	35	Mathematics	02-02-1989	10500	F
9	Viren	49	Mathematics	03-01-1988	9000	M
10	Prakash	22	Physics	17-02-1992	8000	M

(i) Write a query to display the year of latest joined Faculty.
(ii) Write a query to display the month of DOJ of female faculty.
(iii) Write a query to display the records of all the faculties joined in the month of feb.
(iv) Write the query to count the no of faculties joined in the year 1988.

Table : ACCESSORIES

No	Name	Price	Id
A01	Mother Board	12000	S01
A02	Hard Disk	5000	S01
A03	Keyboard	500	S02
A04	Mouse	300	S01
A05	Mother Board	13000	S02
A06	Keyboard	400	S03
A07	LCD	6000	S04
T08	LCD	5500	S05
T09	Mouse	350	S05
T10	Hard Disk	4500	S03

Write SQL queries for the following:
(i) To display Name and Price of all Accessories in ascending order of their Price
(ii) Display average price of Keyboard and Hard Disk
(iii) Display Name, Price of All Accessories and their respective SName, where they are available.
(iv) To display name of accessories whose price is greater than 1000 in descending order.

32 Miss Manju, 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: **4**

	School	No_of_students	Topper	First_Runnerup
CO1	PPS	40	32	8
CO2	JPS	30	18	12
CO3	GPS	20	18	2
CO4	MPS	18	10	8
CO5	BPS	28	20	8

A. Predict the output of the following python statement:

i. df.shape
ii. df[2:4]

B. Write Python statement to display the data of No_of_students column of CO2 to CO3.

OR (Option for part iii only)

Write Python statement to compute and display the difference of data of No_of_students column and Topper column of the above given DataFrame.

SECTION E

33 Write suitable SQL queries for the following:

i. To calculate the value of 2 raised to power 5.

ii. To display system date and time.

iii. To round off the value 5634.4567 to tenth place.

iv. To remove all the probable leading and trailing spaces from the column userid of the table named user.

v. To display the index position of 'end' in the string 'Kendriya Vidyalaya'.

OR

Geeta has created the tables SHOPPE given below:

Table: SHOPPE

ID	SNAME	AREA
S01	ABC Computeronics	CP
S02	All Infotech Media	GK II
S03	Tech Shoppe	CP
S04	Geeks Tecno Soft	Nehru Place
S05	Hitech Tech Store	Nehru Place

Help her in writing queries to perform the following task:

i. Change the Area of shop having ID 'S04' to 'Malviya Nagar

ii. Insert the new record with values ['S06','Ashina Jewellers','Rohini']

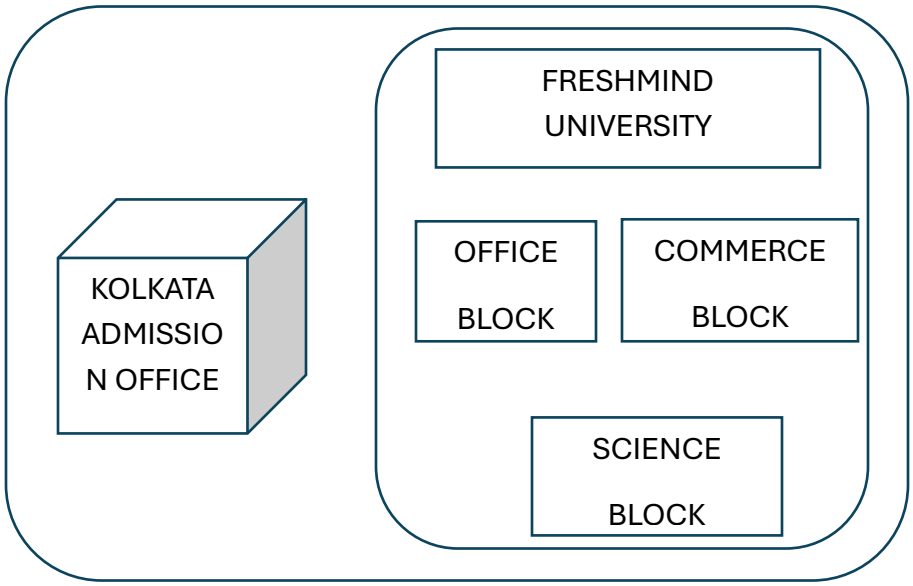
iii. To delete the record of shop 'Geeks Tecno Soft'

iv. To add a new column named 'Pincode'

v. To display the name of shop in area 'Nehru Place'

34 Freshminds University of India is starting its first campus Anna Nagar of South India with its centre admission office in Kolkata. The university has three major blocks comprising of Office Block, Science Block and Commerce Block in the 5 km area campus. **5**

As a network expert, you need to suggest the network plan as per (i) to (v) to the authorities keeping in mind the distance and other given parameters.



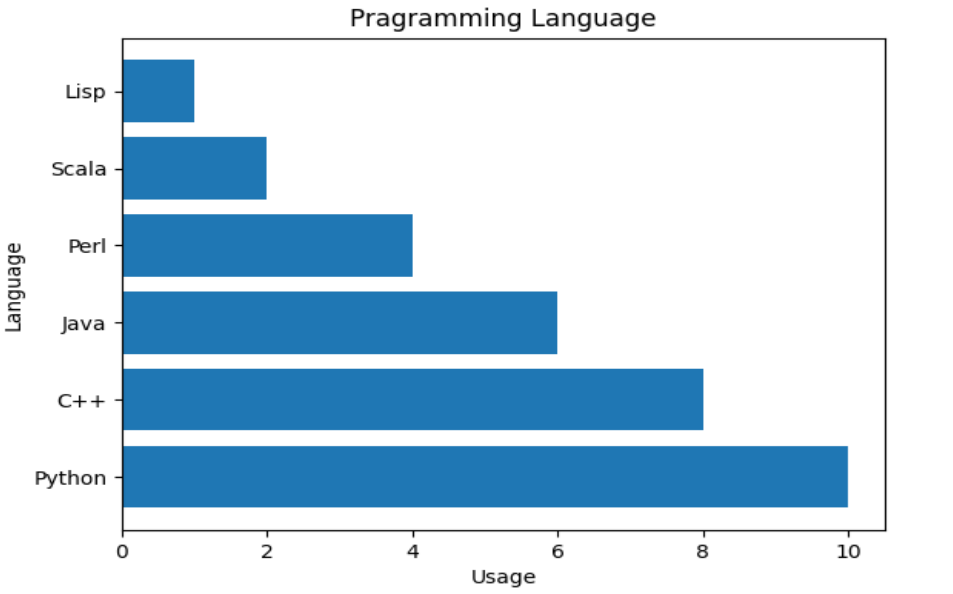
Expected distance between various locations

Office Block to Science Block	90 m
Office Block to Commerce Block	80 m
Science Block to Commerce Block	15 m
Kolkata Admission Office to Anna Nagar Campus	2450 km

Expected number of computers to install at various locations

Office Block	10
Science Block	140
Commerce Block	30
Kolkata Admission Office	8

i. Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks
ii. Suggest the most suitable place (i.e. block) to house the server of this university with a suitable reason.
iii. Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers.
   (a) Switch
   (b) Modem
   (c) Gateway

	iv. Suggest the most suitable (very high speed) service to provide data connectivity between Admission Office located in Anna Nagar from the following options: (a) Telephone lines (b) Fixed line dial-up connection (c) Co-axial cable network (d) GSM (e) Leased lines (f) Satellite v. Is there a requirement of a repeater in the given cable layout? Why/Why not?	
35	Write a Python program to display a bar chart of the number of students in a school. Use different colours for each bar. Sample data: Class: I,II,III,IV,V,VI,VII,VIII,IX,X Strength: 38,30,45,49,37,53,48,44,36,46 OR Write a Python program to plot the given bar graph to depict the popularity of various programming languages. Label the graph with x-axis, y-axis, y-ticks and title. Data : Programming languages: Python, C++, Java, Perl, Scala, Lisp Usage= 10,8,6,4,2,1 	**5**

MARKING SCHEME

Class : XII

Subject : Informatics Practices(065)

Maximum Marks : 70 **Time : 3:00 Hrs**

Q.No.	Answer	Marks
	SECTION A	
1	(A) Computer	**1**
2	ii. Beryllium	**1**
3	ii. Installing antivirus for protection	**1**
4	(B) 8,12	**1**
5	d. 50	**1**
6	ii. Open	**1**
7	(e) count(*)	**1**
8	b) ALTER	**1**
9	iv. march	**1**
10	(b) Series	**1**
11	i. MAX( )	**1**
12	(b) size	**1**
13	i. Copyright	**1**
14	Show tables;	**1**
15	b) Dynamic web page, because data is changing on the web page every time we visit the website according to the users view point	**1**
16	iii. Creative Commons	**1**
17	(a)	**1**
18	iii. A is True but R is False	**1**

SECTION B

19 URL: It stands for Uniform Resource Locator. It provides the location and mechanism (protocol) to access the resources over the internet. **2**

URL is sometimes also called a web address. It not only contains the domain name, but other information as well that completes a web address.

Examples:

https://www.cbse.nic.in, https://www.mhrd.gov.in, http://www.ncert.nic.in, http://www.airindia.in, etc.

OR

Static Website	Dynamic Website
Content of Web pages can not be changed at runtime	Content of Web pages can be changed at runtime
No interaction with database possible	Interaction with database is possible.
It is faster to load	It is slower
Development cost is less	Development cost is more
HTML,CSS,Javascript is used for developing the website	Server side languages such as PHP etc. are used
Same content is delivered everytime the page is loaded	Content may change everytime the page is loaded.

20

```
import pandas as pd
Data=[4,7,8,4]
df= pd.Series(Data)
print(df)
```

2

21 i. select instr(“Hey, where are you going” ,”are”); **2**

ii. select left(“Hey, where are you going”);

22 a. **2**

A 3900

B 4100

b.

A 390.0

B 410.0

C NaN

D 440.0

F NaN

23 1. Respect the privacy of others **2**

2. Avoid posting inflammatory or offensive comments online
3. Never spam others by sending unnecessary emails

	4. Show good sportsmanship while playing games online	
24	import pandas as pd s1=pd.Series([10,20,30,40,71,50]) print(s1[4])	**2**
25		**2**

Char	Varchar
CHAR is used to store character strings of fixed size.	VARCHAR is used to store character strings that have a variable size.
CHAR pad values with trailing spaces to reach fixed size.	VARCHAR does not pad values.
CHAR can waste space for shorter values.	VARCHAR is more space efficient for shorter values.
CHAR takes one byte per character for storage	VARCHAR takes one byte per character for storage plus one or two bytes extra for storing length information.
Processing of char is faster	Processing of varchar is slow

SECTION C

26 (iv) **3**

right(PName,2)
sh
sh
an
il

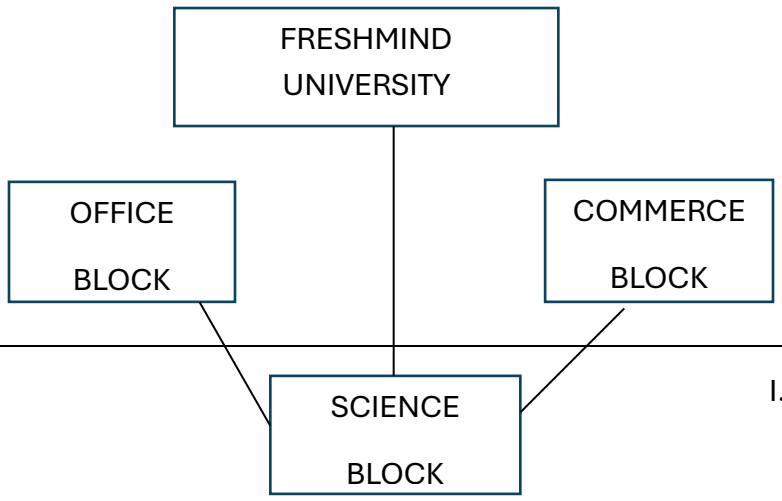
(v)

PName
Mus
Sun

	Son Sah (vi) Sum(Fee) 17300 OR (i) select avg(fee) from hospital group by gener; (ii) select max(fee) from hospital group by gener; (iii) select * from hospital order by PName desc;	
27	import pandas as pd d={'A':[1,5],'B':[2,6],'C':[3,8]} df=pd.DataFrame(d) print(df)	**3**
28	i. create database STORE; ii. create table Furniture (ItemCode char(5) primary key, ItemName varchar(20), Price integer);	**3**
29	i. Nadira 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. OR 1. Headache. 2. Fatigue and lack of motivation. 3. Memory problems. 4. Lack of concentration. 5. Sleeping problems. 6. Learning problems.	**3**
30	(i) DF.loc[len(DF.index),:]=[7,8,9] (ii) DF.rename(columns={'B':'AB'},inplace=True) (iii)DF['AC']=[10,11]	**3**
SECTION D		
31	(v) Select year(max(DOJ)) from College;	**4**

	(vi) Select month(DOJ) from College where sex=”F”; (vii) Select * from college where monthname(DOJ)=”FEB”; (viii) Select count(*) from college where year(DOJ)=”1988”;	
32	A. i. (5,4) ii. Topper First_Runnerup CO1 32 8 CO2 18 12 CO3 18 2 CO4 10 8 CO5 20 8 B. print(df.loc[‘CO2:’CO3‘, No_of_students’]) OR (Option for part iii only) df[‘diff’]=df[‘ No_of_students’]-df[‘ Topper ‘]	**4**
	SECTION E	

33	i. select pow(2,5);
	ii. select sysdate()
	iii. select round(5634.4567,-1);
	iv. select trim(userid) from user;
	v. select instr(‘Kendriya Vidyalaya’,’end’);
	
	OR
	vi. Update SHOPPE set AREA=’Malviya Nager’ where ID =‘S04’;
	vii. Insert into SHOPPE values (‘S06’,’Ashina Jewellers’,’Rohini’);
	viii. delete from SHOPPE where SNAME=‘Geeks Tecno Soft’;
	ix. alter table SHOPPE add column Pincode cahr(6);
	x. Select SNAME from SHOPPE where AREA= ‘Nehru Place’;	

34	vi.  	**5**

	vii. Science Block viii. Switch ix. Satellite x. Office Block to Science Block and Office Block to Commerce Block because distance is greater than 70 m	
35	import matplotlib.pyplot as plt cls=['I','II','III','IV','V','VI','VII','VIII','IX','X'] strength=[38,30,45,49,37,53,48,44,36,46] plt.bar(cls,strength,color=['b','r','k','m','c','g','y','m','b','r']) plt.xlabel('Class') plt.ylabel('Strength') plt.show() OR import matplotlib.pyplot as plt lang=['Python', 'C++', 'Java', 'Perl', 'Scala', 'Lisp'] usage=[10,8,6,4,2,1] plt.barh(lang,usage) plt.xlabel('Usage') plt.ylabel('Language') plt.title('Pragramming Language') plt.show()	**5**

****