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केन्द्रीय विद्यालय संगठन

केन्द्रीय विद्यालय संगठन, पटना संभाग

KENDRIYA VIDYALAYA SANGATHAN, PATNA REGION

INFORMATICS PRACTICES (065)

CLASS - XII

STUDENT SUPPORT MATERIAL CBSE CURRICULUM

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Informatics Practices
CLASS XII
Code No. 065
2023-2024

1. **Prerequisite:** Informatics Practices – Class XI

2. **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.

3. **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	0	12
4	Societal Impacts	10	14	-	14
	Project	-	-	7	7
	Practical	30	-	-	-
	Total	100	71	49	120

4. 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 network: PAN, LAN, MAN, WAN.

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

Network Topologies: Star, Bus, Tree, Mesh.

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

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

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

Unit 4: Societal Impacts

Digital footprint, net and communication etiquettes, data protection, intellectual property rights (IPR), plagiarism, licensing and copyright, free and open source software (FOSS), cybercrime and cyber laws, hacking, phishing, cyber bullying, overview of Indian IT Act.

E-waste: hazards and management.

Awareness about health concerns related to the usage of technology.

Project Work

The aim of the class project is to create tangible and useful IT application. The learner may identify a real-world problem by exploring the environment. e.g. Students can visit shops/business places, communities or other organizations in their localities and enquire about the functioning of the organization, and how data are generated, stored, and managed.

The learner can take data stored in csv or database file and analyze using Python libraries and generate appropriate charts to visualize.

Learners can use Python libraries of their choice to develop software for their school or any other social good.

Learners should be sensitized to avoid plagiarism and violation of copyright issues while working on projects. Teachers should take necessary measures for this. Any resources (data, image etc.) used in the project must be suitably referenced.

The project can be done individually or in groups of 2 to 3 students. The project should be started by students at least 6 months before the submission deadline.

Practical Marks Distribution

S. No.	Unit Name	Marks
1	Programs using Pandas and Matplotlib	8
2	SQL Queries	7

3	Practical file (minimum of 15 programs based on Pandas, 4 based on Matplotlib and 15 SQL queries must be included)	5
4	Project Work (using concepts learned in class XI and XII)	5
5	Viva-Voce	5
	TOTAL	30

5. Suggested Practical List

5.1 Data Handling

1. Create a panda's series from a dictionary of values and a ndarray
2. Given a Series, print all the elements that are above the 75th percentile.
3. Create a Data Frame quarterly sales where each row contains the item category, item name, and expenditure. Group the rows by the category and print the total expenditure per category.
4. Create a data frame for examination result and display row labels, column labels data types of each column and the dimensions
5. Filter out rows based on different criteria such as duplicate rows.
6. Importing and exporting data between pandas and CSV file

5.2 Visualization

1. Given the school result data, analyses the performance of the students on different parameters, e.g subject wise or class wise.
2. For the Data frames created above, analyze, and plot appropriate charts with title and legend.
3. Take data of your interest from an open source (e.g. data.gov.in), aggregate and summarize it. Then plot it using different plotting functions of the Matplotlib library.

5.3 Data Management

1. Create a student table with the student id, name, and marks as attributes where the student id is the primary key.
2. Insert the details of a new student in the above table.
3. Delete the details of a student in the above table.
4. Use the select command to get the details of the students with marks more than 80.
5. Find the min, max, sum, and average of the marks in a student marks table.
6. Find the total number of customers from each country in the table (customer ID, customer Name, country) using group by.
7. Write a SQL query to order the (student ID, marks) table in descending order of the marks.

Python Library - Pandas

It is a most famous Python package for data science, which offers powerful and flexible data structures that make data analysis and manipulation easy. Pandas builds on packages like numpy and matplotlib to give us a single convenient place for data analysis and visualization work.

Basic Features of Pandas

1. Dataframe object help a lot in keeping track of our data.
2. With a pandas dataframe, we can have different data types (float, int, string, datetime etc.) all in one place.
3. Pandas has built in functionality like easy grouping & joins of data.
4. Good IO capabilities; easily pull data from a MySQL database directly into a data frame.
5. Tools for loading data in to in memory data objects from different file formats.
6. Data alignment and integrated handling of missing data.
7. Reshaping and pivoting of data sets.
8. Label based slicing, indexing and sub setting of large data sets.

1. Series

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

Basic feature of series are

❖ Homogeneous data
❖ Size Immutable
❖ Values of Data Mutable

Series	
index	value
0	12
1	-4
2	7
3	9

Creation of Series is possible from – ndarray, dictionary, and scalar value.

Syntax: pandas.Series(data, index, dtype, copy).

Series can be created using
1.   Array
2.   Dict
3.   Scalar value or constant

Creation of an Empty Series:
import pandas as pd
s = pd.Series()
print(s)
Output: 	 Series([], dtype: float64)

Creation of a Series from ndarray without index:
import pandas as pd
import numpy as np
data = np.array(['a', 'b', 'c', 'd'])
s = pd.Series(data)
print(s)
Output:
1	a
2	b
3	c
4	d
dtype: object

Note: default index is starting from 0
Creation of a Series from ndarray with index:
import pandas as pd
import numpy as np

```
data = np.array(['a', 'b', 'c', 'd'])
s = pd.Series(data, index = [100, 101, 102, 103])
print(s)
```
Output:
```
100    a
101    b
102    c
103    d
dtype: object
```
Note: index is starting from 100

Creation a Series from dict:

Eg.1(without index)
```
import pandas as pd
import numpy as np
data = {'a' : 0., 'b' : 1., 'c' : 2.}
s = pd.Series(data)
print(s)
```
Output:
```
a      0.0
b      1.0
c      2.0
dtype: float64
```

Eg.2 (with index)
```
import pandas as pd
import numpy as np
data = {'a' : 0., 'b' : 1., 'c' : 2.}
s = pd.Series(data, index = ['b', 'c', 'd', 'a'])
print(s)
Output
b      1.0
c      2.0
d      NaN
a      0.0
dtype: float64
```

Creation a Series from Scalar:
```
import pandas as pd
import numpy as np
s = pd.Series(5, index = [0, 1, 2, 3])
print(s)
```

Output:
```
0      5
1      5
2      5
3      5
dtype: int64
```

Note: Here 5 is repeated for 4 times (as per number of index)

Arithmetical operations with Series:

import pandas as pd   **output:**

```
s = pd.Series([1, 2, 3])                               0      2
t = pd.Series([1, 2, 4])                               1      4
u= s + t          #addition operation                  2      7
print(u)                                               dtype: int64


u=s * t           # multiplication operation           0      1
print(u)                                               1      4
                                                       2      12
                                                       dtype: int64
```

head() function:

```
import pandas as pd
s = pd.Series([1, 2, 3, 4, 5], index = ['a', 'b' ,'c' ,'d' , 'e'])
print (s.head(3))         # Return first 3 elements
```

Output:

```
a      1
b      2
c      3
dtype: int64
```

tail() function:

```
import pandas as pd
s = pd.Series([1, 2, 3, 4, 5], index = ['a', 'b', 'c', 'd', 'e'])
print (s.tail(3))          # Return last 3 elements
```

Output:

```
c      3
d      4
e      5
dtype: int64
```

Accessing Data from Series with indexing and slicing:

```
import pandas as pd
s = pd.Series([1, 2, 3, 4, 5], index = ['a', 'b', 'c' ,'d', 'e'])
print(s[0])      #for 0 index position
print(s[:3])     #for first 3 index values
print([-3:])     #for last 3 index values
```

Output:

```
1
a      1
b      2
c      3
dtype: int64
c      3
d      4
e      5
dtype: int64
```

Retrieve Data Using Label as index:

```
import pandas as pd
s = pd.Series([1,2,3,4,5], index = ['a', 'b', 'c', 'd', 'e'])
```

print (s[['c', 'd']])
Output
c   3
d   4
dtype:int64

Retrieve Data from selection:
There are two methods for data selection:
- ❖ loc gets rows (or columns) with particular labels from the index.
- ❖ iloc gets rows (or columns) at particular positions in the index (so it only takes integers).

e.g.
>>> s = pd.Series(np.nan , index=[49,48,47,46,45, 1, 2, 3, 4, 5])
>>>s.iloc [:3] # slice the first three rows
49   NaN
48   NaN
47   NaN
>>> s.loc [:3] # slice up to label 3
49   NaN
48   NaN
47   NaN
46   NaN
45   NaN
1   NaN
2   NaN
3   NaN

Related questions from pre board papers
1. Write the output of the following:
import pandas as pd
D = {}
for i in range(25, 95, 10):
D[i] = i + 10
S1 = pd.Series(D)
print(S1)
Ans.
25   35
35   45
45   55
55   65
65   75
75   85
85   95
dtype: int64

2. Write the output of the following:
 import pandas as pd
L = [1, 2]
for i in range(25, 95, 10):
L.append(i)
S1 = pd.Series(L)
print(S1)
Ans.
0   1

```
1    2
2    25
3    35
4    45
5    55
6    65
7    75
8    85
dtype: int64
```

3. Write a program to display all odd numbers and its sum from the given Pandas Series.

```
0    15
1    2
2    8
3    4
4    1
5    25
6    30
```

Ans.
import pandas as pd
S1 = pd.Series([15, 2, 8, 4, 1, 25, 30])
S2 = S1[S1 % 2 != 0]
print("Sum of all odd numbers is : ", sum(S2.values))

4. Write a program in python to display all values of given pandas series with first character in upper case.
for example original Series is :

```
0    ravi
1    ram
2    sonu
3    david
```

Expected Output:

```
0    Ravi
1     Ram
2    Sonu
3    David
dtype: object
```

Ans.
import pandas as pd
S1 = pd.Series(["ravi", "ram", "sonu", "david"])
L = S1.values
L1 = [ ]
for i in L:
    L1.append(i[0].upper() + i[1:])
S2 = pd.Series(L1)
print(S2)

5. Write a program to find the minimum, maximum, and average of all the values of given Pandas Series.

```
0    15
1    2
2    8
3    4
```

```
4    1
5    5
6    14
```

Ans.
```
import pandas as pd
S1 = pd.Series([15, 2, 8, 4, 1, 5, 14])
print("Maximum value is : ", max(S1.values))
print("Minimum value is : ", min(S1.values))
print("Average value is : ", sum(S1.values) / S1.count())
```

6. Write a program to arrange the given Pandas Series in increasing order.
```
0    150
1    252
2    85
3    420
4    111
5    275
```

Ans.
```
import pandas as pd
S1 = pd.Series([150, 252, 85, 420, 111, 235])
print("Series after sorting is: ")
print(S1.sort_values())
```

7. Write a program to increase those value in the given Pandas Series by 50 which are less than 70.
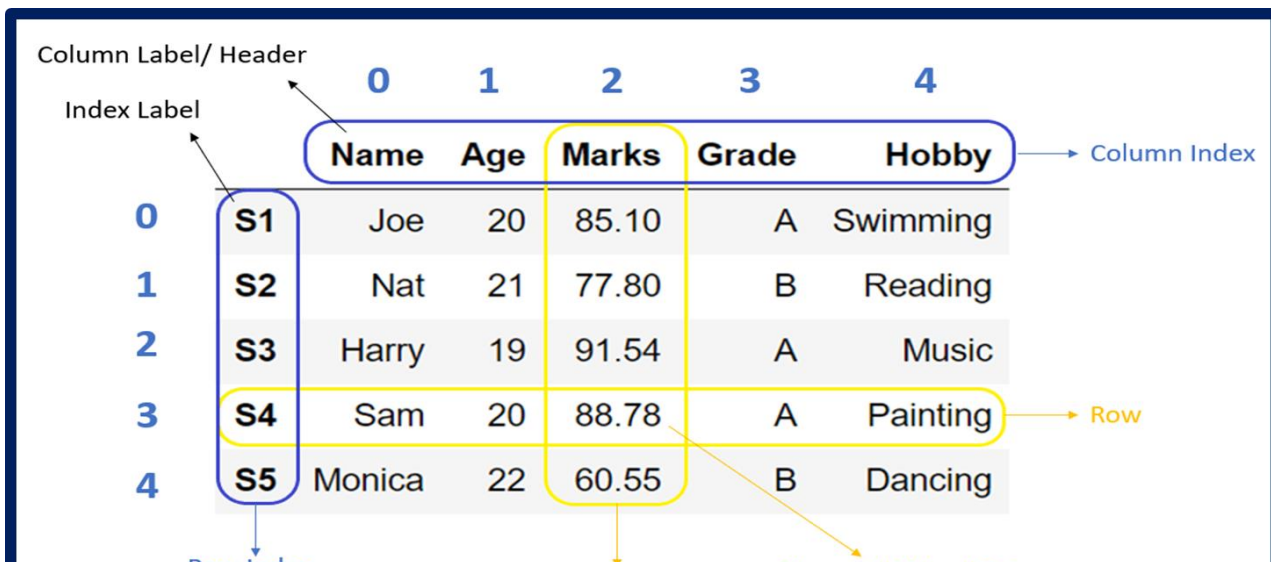```
0   150
1   252
2   35
3   420
4   50
5   61
6   275
```

**Ans.**
```
import pandas as pd
S1 = pd.Series([150, 252, 35, 420, 61, 275])
S1[S1 < 70] = S1[S1 < 70] + 50
print(S1)
```

## Data Frames

Data Frames is a two-dimensional (2-D) data structure defined in pandas which consist of rows and columns.

**Characteristics of Data Frames:**

1. The data stored in a data frame is heterogeneous can be of numeric, factor or character type.

2. Data Frame has 2 axes (indices) rows and columns

        o   Row index (axis=0) ->known as index
        o   Column index (axis=1) ->known as column-name

3. Size – Mutable

4. Value is mutable

5. Element of data frame can be accessed using row indices along with column indices.

6. Can Perform Arithmetic operations on rows and columns

**Creation of Data Frames:**

A pandas DataFrame can be created using the following constructor function:

pandas.DataFrame(data, index, columns, dtype, copy)

Parameters Details:

| Parameter | Description |
|---|---|
| data | data takes various forms like ndarray, series, lists, dict, tuple and also another Data Frame. |
| index | For the row labels, it is Optional Default np.arange(n) if no index is passed. |
| columns | For column labels, it is Optional Default np.arange(n) |
| dtype | Data type of each column, To enforce a single dtype |
| copy | This command is used for copying of data |

Creation an Empty DataFrame:

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

Output

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

Creation a DataFrame from List:

```
import pandas as pd
l=['Ravi','Kamal','Tom']
```

```
        0
0    Ravi
```

```python
import pandas as pd
l=[['Ravi',100],['Kamal',200],['Tom',300]]
df = pd.DataFrame(l)
print(df)
```

Output

```
       0     1
0   Ravi   100
1  Kamal   200
2    Tom   300
```

```python
import pandas as pd
l=[['Ravi',100],['Kamal',200],['Tom',300]]
df = pd.DataFrame(l,columns=["name","Fees"])
print(df)
```

Output

```
    name   Fees
0   Ravi   100
1  Kamal   200
2    Tom   300
```

Creation a DataFrame from Dict of Lists: All the Lists must be of same length. If index is passed, then the length of the index should equal to the length of the Lists.

```python
import pandas as pd
data = {
    "Roll": [1, 2, 3],
    "Name": ['Amit', 'Ravi', 'Ratul'],
    "Fees":[500.50,300,400]
}
df = pd.DataFrame(data)
print(df)
```

Output

```
   Roll   Name   Fees
0     1   Amit  500.5
1     2   Ravi  300.0
2     3  Ratul  400.0
```

Creation an indexed DataFrame using Lists:

```python
import pandas as pd
data = {
    "Roll": [1, 2, 3],
    "Name": ['Amit', 'Ravi', 'Ratul'],
    "Fees":[500.50,300,400]
}
df = pd.DataFrame(data,index=['R1','R2','R3'])
print(df)
```

Output

```
    Roll   Name   Fees
R1     1   Amit  500.5
R2     2   Ravi  300.0
R3     3  Ratul  400.0
```

Creation a DataFrame from List of Dicts: List of Dictionaries can be passed as input data to create a DataFrame. The dictionary keys are by default taken as column names.

```python
import pandas as pd
data =[{'roll':1,'name':'Amit','Age':20},
       {'roll':2,'name':'Ravi','Age':25},
       {'roll':3,'name':'Ratul','Age':35,'fees':200}
```

Output

```
   roll   name  Age  fees
0     1   Amit   20   NaN
```

Creation an indexed DataFrame using Lists of Dicts

```python
import pandas as pd
data =[{'roll':1,'name':'Amit','Age':20},
       {'roll':2,'name':'Ravi','Age':25},
       {'roll':3,'name':'Ratul','Age':35,'fees':200}
      ]
df = pd.DataFrame(data,index=['R1','R2','R3'])
print(df)
```

Output

```
    roll  name  Age  fees
R1     1  Amit   20   NaN
R2     2  Ravi   25   NaN
R3     3  Ratul  35  200.0
```

Creation a Data Frame from Dictionary of Series: Dictionary of Series can be passed to form a DataFrame. The resultant index is the union of all the series indexes passed. The dictionary keys are by default taken as column names.

```python
import pandas as pd
data={'A':pd.Series([10,20,30],index=['R1','R2','R3']),
      'B':pd.Series([5,15,25],index=['R1','R2','R3'])}
df = pd.DataFrame(data)
print(df)
```

Output

```
     A   B
R1  10   5
R2  20  15
R3  30  25
```

Creation a Data Frame from 2D numpy array: Each row is the corresponding row required in the dataframe.

```python
import pandas as pd
import numpy as np
data = np.array([[1,"Amit",20],
                 [2,"Kamal",25],
                 [3,"Rajiv",26],
                 [4,"Ram",15]])
df = pd.DataFrame(data,columns=['Roll','Name','Age'])
print(df)
```

Output

```
   Roll   Name  Age
0     1   Amit   20
1     2  Kamal   25
```

Attributes of DataFrames:

Attributes are the properties of a DataFrame that can be used to fetch data or any information related to a particular dataframe.

```
     Roll    Name     Fees
R1      1    Amit   500.5
R2      2    Ravi   300.0
R3      3   Ratul   400.0
```

1. index - The index(row labels) of the DataFrame

```
>>> df.index
Index(['R1', 'R2', 'R3'], dtype='object')
```

2. If index is 0, 1, 2 then it will return range index

```
>>> df.index
RangeIndex(start=0, stop=3, step=1)
```

3. columns - The Columns labels of the DataFrame

```
>>> df.columns
Index(['Roll', 'Name', 'Fees'], dtype='object')
```

4. axes - Returns a list containing both the axes(row and column axis)

```
>>> df.axes
[Index(['R1', 'R2', 'R3'], dtype='object'), Index(['Roll', 'Name', 'Fees'], dtype='object')]
```

5. dtypes - Returns the dtypes of the DataFrame

```
>>> df.dtypes
Roll          int64
Name         object
Fees        float64
dtype: object
```

6. size - Returns an integer representing the number of elements in the DataFrame

```
>>> df.size
9
```

7. shape - Returns a tuple representing the dimension of the DataFrame

```
>>> df.shape
(3, 3)
```

8. values - Returns a numpy array of the dataframe values

```
array([[1, 'Amit', 500.5],
       [2, 'Ravi', 300.0],
       [3, 'Ratul', 400.0]]
```

9. empt

```
>>> df.empty
False
```

10. T - This attribute is used to change the rows into columns and columns into rows.

```
          R1        R2        R3
Roll       1         2         3
Name    Amit      Ravi     Ratul
Fees   500.5     300.0     400.0
```

11. ndim - ndim means the number of dimensions.

```
>>> df.ndim
2
```

Accessing DataFrame elements:

```
       Roll    Name    Fees    IP    Eco
R1        1    Amit     500    60     80
R2        2    Ravi     300    50     90
R3        3   Ratul     400    20     60
R4        4     Tom      40    40     20
```

1. To Access a particular column give the name of column inside access operator:

```
>>> df['Name']
R1       Amit
R2       Ravi
R3      Ratul
R4        Tom
Name: Name, dtype: object
```

2. To Access a multiple columns pass a list name of column inside access operator:

```
>>> df[['Name','Fees']]
       Name   Fees
R1     Amit    500
R2     Ravi    300
R3    Ratul    400
R4      Tom     40
```

Access using loc property:

It Access a group of rows and columns by label. loc[] is primarily label based, but may also be used with a Boolean array.

It allows input:

1. A single label
2. A list or array of labels
3. A slice object with labels (both the start and the stop are included)
4. A Boolean array of the same length as the axis being sliced, e.g. [True, False, True].
5. Conditional that returns a Boolean Series

	Roll	Name	Fees	IP	Eco
R1	1	Amit	500	60	80
R2	2	Ravi	300	50	90
R3	3	Ratul	400	20	60
R4	4	Tom	40	40	20

1. Single label. Note this returns the row as a Series.

```
>>> df.loc['R1']
Roll            1
Name         Amit
Fees          500
IP             60
Eco            80
Name: R1, dtype: object
```

2. List of labels.

```
>>> df.loc[['R1','R2']]
    Roll  Name  Fees  IP  Eco
R1     1  Amit   500  60   80
R2     2  Ravi   300  50   90
```

3. A slice object with index labels.

```
>>> df.loc['R1':'R2']
    Roll  Name  Fees  IP  Eco
R1     1  Amit   500  60   80
R2     2  Ravi   300  50   90
```

4. A Boolean array of the same length as index being sliced.

```
>>> df.loc[[True,False,False,True]]
    Roll  Name  Fees  IP  Eco
R1     1  Amit   500  60   80
R4     4   Tom    40  40   20
```

5. Condition that returns a Boolean Series.

```
>>> df.loc[df['Roll']>2]
```

Single label for row and column.
```
>>> df.loc['R1','Name']
'Amit'
```

Slice with labels for row and column.
```
>>> df.loc['R1':'R3','Roll':'IP']
     Roll    Name   Fees    IP
R1      1    Amit    500    60
R2      2    Ravi    300    50
R3      3   Ratul    400    20
```

Boolean list with the same length as the row axis.
```
>>> df.loc[[True,True,False,False]]
     Roll  Name  Fees  IP  Eco
R1      1  Amit   500  60   80
R2      2  Ravi   300  50   90
```

Condition that returns a Boolean Series.
```
>>> df.loc[df['IP']>30]
     Roll   Name   Fees   IP   Eco
R1      1   Amit    500   60    80
R2      2   Ravi    300   50    90
R4      4    Tom     40   40    20
```

ACCESS USING iloc PROPERTY

It Access a group of rows and columns by integer index. It allows input:
1. A single integer index.
2. A list or array of integer index.
3. A slice object with integer index (start index included and the stop not included).
4. A Boolean array of the same length as the axis being sliced, e.g. [True, False, True].
5. Conditional that returns a Boolean Series.

```
     Roll      Name    Fees    IP    Eco
R1      1      Amit     500    60     80
R2      2      Ravi     300    50     90
R3      3     Ratul     400    20     60
R4      4       Tom      40    40     20
```

1. A single integer index.
```
>>> df.iloc[0]
Roll         1
Name      Amit
Fees       500
```

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2. A list or array of integer index.

```
>>> df.iloc[[0,1,2]]
    Roll  Name  Fees  IP  Eco
R1    1   Amit  500   60   80
R2    2   Ravi  300   50   90
R3    3  Ratul  400   20   60
```

3. A slice object with integer index.

```
>>> df.iloc[:2]
    Roll  Name  Fees  IP  Eco
R1    1   Amit  500   60   80
R2    2   Ravi  300   50   90
```

4. A Boolean array.

```
>>> df.iloc[[True,True,False,False]]
    Roll  Name  Fees  IP  Eco
R1    1   Amit  500   60   80
R2    2   Ravi  300   50   90
```

Indexing the rows and columns:

You can mix the indexer types for the index and columns.

1. A single integer index.

```
>>> df.iloc[0,1]
'Amit'
```

2. A list or array of integer index.

```
>>> df.iloc[[0,2],[1,3]]
     Name  IP
R1   Amit   60
R3  Ratul   20
```

3. A slice object with integer index.

```
>>> df.iloc[1:3, 0:3]
    Roll   Name  Fees
R2    2   Ravi   300
R3    3  Ratul   400
```

4. With a Boolean array whose length matches the columns.

```
>>> df.iloc[0:2,[True,True,False,False,False]]
    Roll  Name
R1    1   Amit
R2    2   Ravi
```

iterrows DataFrame elements:

DataFrame.iterrows(): The iterrows() method generates an iterator object of the DataFrame, allowing us to iterate each row of the DataFrame . It returns DataFrame rows as (index, Series) pairs. Iterrows() returns a Series for each row, it does not preserve dtypes across the rows.

```
DataFrame-> df
          Phy   Chem   Maths
Amit     20.0    40     10
Ravi     40.2    50     20
Ratul    10.0    60     30
```

You can use next () function returns the next item of an iterator

```
>>> next(df.iterrows())
('Amit', Phy        20.0
Chem      40.0
Maths     10.0
Name: Amit, dtype: float64)
>>> d=df.iterrows()
>>> for i in d:
        print(i)


('Amit', Phy        20.0
Chem      40.0
Maths     10.0
Name: Amit, dtype: float64)
('Ravi', Phy        40.2
Chem      50.0
Maths     20.0
Name: Ravi, dtype: float64)
('Ratul', Phy       10.0
Chem      60.0
Maths     30.0
Name: Ratul, dtype: float64)
```

You can use next () function returns the next item of an iterator

```
>>> next(df.iteritems())
('Phy', Amit      20.0
Ravi      40.2
Ratul     10.0
Name: Phy, dtype: float64)
>>> d=df.iteritems()
>>> for i in d:
        print(i)


('Phy', Amit      20.0
Ravi      40.2
Ratul     10.0
```

head() method of DataFrame:

DataFrame.head (n = 5): Return the first n rows. This function returns the first n rows for the object based on position. For negative values of n, this function returns all rows except the last n rows

```
DataFrame-> df
          Phy    Chem    Maths
Amit       20      40       10
Ravi       40      50       20
Ratul      10      60       30
Ram        50      20       35
Nawin      80      10       40
Tom        40      30       60
Jack       45      45       45
```

1. When no parameter is given default top 5 Rows will returned

```
>>> df.head()
          Phy    Chem    Maths
Amit       20      40       10
Ravi       40      50       20
Ratul      10      60       30
Ram        50      20       35
Nawin      80      10       40
```

2. When parameter (n) is given top n Rows will returned

```
>>> df.head(2)
          Phy    Chem    Maths
Amit       20      40       10
Ravi       40      50       20
```

3. When negative parameter (-n) is given it will returned all rows excluding last n Rows.

```
>>> df.head(-3)
          Phy    Chem    Maths
Amit       20      40       10
Ravi       40      50       20
Ratul      10      60       30
Ram        50      20       35
```

tail() method of DataFrame:

DataFrame.tail (n = 5): Return the last n rows. This function returns the last n rows for the object based on position.For negative values of n, this function returns all rows except the first n rows

1. When no parameter is given default   last 5 Rows will returned

```
>>> df.tail()
          Phy    Chem    Maths
Ratul      10      60       30
Ram        50      20       35
Nawin      80      10       40
Tom        40      30       60
Jack       45      45       45
```

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2. When parameter (n) is given last n Rows will returned

```
>>> df.tail(2)
          Phy   Chem   Maths
Tom        40     30      60
Jack       45     45      45
```

3. When negative parameter (-n) is given it will returned all rows excluding first n Rows.

```
>>> df.tail(-3)
           Phy   Chem   Maths
Ram         50     20      35
Nawin       80     10      40
Tom         40     30      60
Jack        45     45      45
```

Modify DataFrame elements:

```
      Roll      Name     Fees     IP    Eco
R1      1      Amit      500     60     80
R2      2      Ravi      300     50     90
R3      3     Ratul      400     20     60
R4      4       Tom       40     40     20
```

loc/iloc is used to modify one or multiple elements:

Modify single element using loc property

```
>>> df.loc['R1','Name']='Vikash'
>>> df
      Roll      Name    Fees    IP   Eco
R1      1     Vikash     500    60    80
R2      2       Ravi     300    50    90
R3      3      Ratul     400    20    60
R4      4        Tom      40    40    20
```

Modify Multiple elements using loc property

```
>>> df.loc['R1',['Roll','Name']]=[5,'Jack']
>>> df
      Roll    Name   Fees   IP   Eco
R1      5     Jack    500   60    80
R2      2     Ravi    300   50    90
R3      3    Ratul    400   20    60
R4      4      Tom     40   40    20
```

Modify Single element using iloc property

```
>>> df.iloc[0,2]=1000
>>> df
      Roll      Name     Fees    IP   Eco
R1      1     Vikash     1000    60    80
R2      2       Ravi      300    50    90
R3      3      Ratul      400    20    60
R4      4        Tom       40    40    20
```

Modify multiple elements using iloc property

```
>>> df.iloc[0:2,0:2]=[5,'Jack']
>>> df
      Roll      Name     Fees    IP   Eco
```

We can also change data of an entire column to a particular value in a DataFrame:

```
        Name   Hindi   Eng
R1      Amit      40    10
R2      Ravi      50    20
R3     Ratul      60    30
```

For example, the following statement sets marks 100 for the column name 'Eng':

```python
# DataFrame df which has 03 columns and 3 rows
import pandas as pd
data = {
    "Name": ['Amit','Ravi','Ratul'],
    "Hindi":[40,50,60],
    "Eng":[10,20,30]
    }
df = pd.DataFrame(data,index=['R1','R2','R3'])
df["Eng"]=0
print(df)
```

```
        Name   Hindi   Eng
R1      Amit      40     0
R2      Ravi      50     0
R3     Ratul      60     0
```

We can also change data of an entire row to a particular value in a DataFrame using loc:

For example if we want to change the record of R1 to ['TOM', 100, 100]

```python
# DataFrame df which has 03 columns and 3 rows
import pandas as pd
data = {
    "Name": ['Amit','Ravi','Ratul'],
    "Hindi":[40,50,60],
    "Eng":[10,20,30]
    }
df = pd.DataFrame(data,index=['R1','R2','R3'])
df.loc['R1']=["Tom",100,100]
print(df)
```

```
        Name   Hindi   Eng
R1       Tom     100   100
R2      Ravi      50    20
R3     Ratul      60    30
```

if we want to change the record of R1 to 0

```python
df.loc['R1']=0
```

OUT ➡

```
        Name   Hindi   Eng
R1         0       0     0
R2      Ravi      50    20
R3     Ratul      60    30
```

if we want to change the All the records to 0

```python
df.loc['R1':'R3']=0
```

OUT ➡

```
        Name   Hindi   Eng
R1         0       0     0
R2         0       0     0
R3         0       0     0
```

```python
df.loc[:]=0        df.loc[:,:]=0
```

Adding new column to DataFrame

```python
# DataFrame df which has 02 columns and 4 rows
import pandas as pd
data = {
    "Roll": [1, 2,3,4],
    "Name": ['Amit', 'Ravi', 'Ratul','Tom'],
    }
df = pd.DataFrame(data,
              index=['R1','R2','R3','R4'])
print(df)
```

```
        Roll      Name
R1         1      Amit
R2         2      Ravi
R3         3     Ratul
R4         4       Tom
```

Add a new column Hindi to the dataframe df

Method -1: By declaring a new list as a column. New column will add in last

```python
# DataFrame df which has 02 columns and 4 rows
import pandas as pd
data = {
   "Roll": [1, 2,3,4],
   "Name": ['Amit', 'Ravi', 'Ratul','Tom'],
   }
df = pd.DataFrame(data,
                  index=['R1','R2','R3','R4'])
# Using 'Hindi' as the column name
# and assign a list to Hindi
df['Hindi']=[30,40,50,60]
print(df)
```

```
     Roll   Name   Hindi
R1     1    Amit      30
R2     2    Ravi      40
R3     3   Ratul      50
R4     4    Tom       60
```

Method -2: By using DataFrame.insert() to add a column at any position we like and not just at the end

```python
# DataFrame df which has 02 columns and 4 rows
import pandas as pd
data = {
   "Roll": [1,2,3,4],
   "Name": ['Amit', 'Ravi', 'Ratul','Tom'],
   }
df = pd.DataFrame(data,
                  index=['R1','R2','R3','R4'])
# Using DataFrame.insert() to add a column
df.insert(1, "Hindi", [40, 50, 60, 70])    Col add at pos-1
print(df)
```

```
     Roll   Hindi   Name
R1     1      40    Amit
R2     2      50    Ravi
R3     3      60   Ratul
R4     4      70     Tom
```

Add a new record ['Tom', 80, 40] to the dataframe df

EX-1: loc is used add a row at the last of dataframe
```python
# DataFrame df which has 03 columns and 3 rows
import pandas as pd
data = {
   "Name": ['Amit','Ravi','Ratul'],
   "Hindi":[40,50,60],
   "Eng":[10,20,30]
 }
df = pd.DataFrame(data,index=['R1','R2','R3'])
#add a row in the last of df
df.loc['R4']=['Tom',80,40]    Add row  at pos-R4
print(df)
```

```
      Name   Hindi   Eng
R1    Amit      40    10
R2    Ravi      50    20
R3   Ratul      60    30
R4     Tom      80    40
```

EX-2: if row inserted in between the dataframe existing row will replaced
```python
# DataFrame df which has 03 columns and 3 rows
import pandas as pd
data = {
   "Name": ['Amit','Ravi','Ratul'],
   "Hindi":[40,50,60],
   "Eng":[10,20,30]
 }
df = pd.DataFrame(data,index=['R1','R2','R3'])
# New row added at Postion R1
df.loc['R1']=['Jack',0,0]    Add row  at pos-R1
print(df)
```

```
      Name   Hindi   Eng
R1    Jack       0     0
R2    Ravi      50    20
R3   Ratul      60    30
```

Deleting rows and columns from a DataFrame

We can use the DataFrame.drop() method to delete rows and columns from a DataFrame. We need to specify the names of the labels to be dropped and the axis from which they need to be dropped. By Default axis is 0 or index

DELETING ROWs

```python
# DataFrame df which has 03 columns and 3 rows
import pandas as pd
data = {
    "Name": ['Amit','Ravi','Ratul'],
    "Hindi":[40,50,60],
    "Eng":[10,20,30]
  }
df = pd.DataFrame(data,index=['R1','R2','R3'])
print(df)
```

Consider the dataFrame df

```
        Name   Hindi   Eng
R1      Amit      40    10
R2      Ravi      50    20
R3     Ratul      60    30
```

Python statement to delete ROW /RECORD 'R1'

```python
df=df.drop('R1',axis=0)
```
OR
```python
df=df.drop('R1')
```
OR
```python
df=df.drop('R1',axis='index')
```

out →
```
      Name  Hindi  Eng
R2    Ravi     50   20
R3   Ratul     60   30
```

Multiple rows can be deleted if list of index is passed to drop()

```python
df=df.drop(['R1','R2'],axis=0)
```

out ↓
```
       Name   Hindi   Eng
R3    Ratul      60    30
```

Deleting columns from a DataFrame

```python
# DataFrame df which has 03 columns and 3 rows
import pandas as pd
data = {
    "Name": ['Amit','Ravi','Ratul'],
    "Hindi":[40,50,60],
    "Eng":[10,20,30]
  }
df = pd.DataFrame(data,index=['R1','R2','R3'])
print(df)
```

Consider the dataFrame df

```
        Name   Hindi   Eng
R1      Amit      40    10
R2      Ravi      50    20
R3     Ratul      60    30
```

Python statement to delete COLUMN 'Name'

```python
df=df.drop('Name',axis=1)  OR  df=df.drop('Name',axis='columns')
```

out →
```
      Hindi  Eng
R1       40   10
R2       50   20
R3       60   30
```

Multiple columns can be deleted if list of columns is passed to drop()

```python
df=df.drop(['Name','Hindi'],axis=1)
```

out →
```
      Eng
R1     10
R2     20
R3     30
```

Boolean Indexing in a DataFrame

Boolean indexing helps us to select the data from the DataFrames using a Boolean vector We need a DataFrame with a Boolean index to use the Boolean indexing. Consider the dataFrame df bellow:

```python
import pandas as pd
data = {
    "Name": ['Amit','Ravi','Ratul'],
    "Hindi":[40,50,60],
    "Eng":[10,20,30]
```

```
              Name   Hindi   Eng
True          Amit      40    10
False         Ravi      50    20
```

Now, we can access the DataFrame by passing Booleans to the methods loc[]

```
print(df.loc[False])
```
OUT ➡

	Name	Hindi	Eng
False	Ravi	50	20
False	Ratul	60	30

Access DataFrame elements using condition test

```
import pandas as pd
data = {
    "IP": [20,40,10],
    "Hindi":[40,50,60],
    "Eng":[10,20,30]
    }
df = pd.DataFrame(data,index=['Amit','Ravi','Ratul'])
print(df)
```

	IP	Hindi	Eng
Amit	20	40	10
Ravi	40	50	20
Ratul	10	60	30

We can access the DataFrame using relational operator

```
print(df[df['IP']>30])
```

```
Amit     False
Ravi      True
Ratul    False
Name: IP, dtype: bool
```

	IP	Hindi	Eng
Ravi	40	50	20

```
print(df.loc[df['IP']>30])
```

	IP	Hindi	Eng
Ravi	40	50	20

Python statement to check in which subjects 'Amit' Scored >30 Marks

```
print(df.loc['Amit',:]>30)
```

```
IP       False
Hindi     True
Eng      False
Name: Amit, dtype: bool
```

Importing/Exporting Data between CSV files and Data Frames.

CSV - A comma-separated values file is a text file that uses a comma to separate values. Each line of the file is a data record. Each record consists of one or more fields, separated by commas.

To read a csv file in dataframe read_csv() method is used

Example Consider a csv file product

product - Notepad
File Edit Format View Help
```
Product, Size, Color, Price
Shirt, Medium, Blue, $14
Shirt, Large, Red, $15
Pants, Medium, Khaki, $23
```

```
import pandas as pd
df = pd.read_csv('product.txt')
print(df)
```
OUT ▷

	Product	Size	Color	Price
0	Shirt	Medium	Blue	$14
1	Shirt	Large	Red	$15
2	Pants	Medium	Khaki	$23

Write a data frame to a csv

To write a dataframe to a csv file to_csv() method is used

Consider following DataFrame df which has Name of candidate and course name

	Name	Course
0	Tom	MBA
1	Jerry	BCA

```
import pandas as pd
d={'Name':['Tom','Jerry'],
   'Course':['MBA', 'BCA']}
df=pd.DataFrame(d)
```
OUT ▷

*course - Notepad
File Edit Format View Help
```
,Name,Course
0,Tom,MBA
```

1. Write the output of the following code:

```
import numpy as np
import pandas as pd
A = np.array([35, 40, 71, 25])
B = np.array([27, 34, 56, 73])
C = [11, 22, 33, 44]
DF = pd.DataFrame([A, B, C])
print(DF)
```

Ans.

```
    0   1   2   3
0  35  40  71  25
1  27  34  56  73
2  11  22  33  44
```

2. Complete the following code to get the Output given below:

```
import pandas as _____
L1 = [["Aman", 45],  ["Ankit", 56],  ["_____",  67]]
DF = pd._____(L1, _____=["Name", "Marks"], index=[_____])
print(DF)
```

Output:

```
        Name        Marks
1       Aman         45
2       Ankit        56
3       Sunita       67
```

Ans.

```
import pandas as pd
L1 = [["Aman", 45],  ["Ankit", 56],  ["Sunita", 67]]
DF = pd.DataFrame(L1, columns = ["Name", "Marks"], index = [1, 2, 3])
print(DF)
```

3. Which attribute of dataframe is used for the following:
(i) To display row labels.
(ii) To display column labels.
(iii) To display data type of each column in the DataFrame.
(iv) To display all the values in the DataFrame.
(v) To display number of rows and columns in a tuple.
(vi) To display total number of values in the dataframe.
(vii) To transpose the dataframe.
(viii) To returns the value True if DataFrame is empty and False otherwise.

Ans.
(i) index, (ii) columns, (iii) dtypes, (iv) values, (v) shape, (vi) size, (vii) T, (viii) empty

4. Aman wants to add a new row with values ("Suman", 9, 11) at the end of the dataframe "df". He does not know the total number of rows available in dataframe. As a friend of Aman, help him to write the code.
Ans. df.loc[len(df.index)] = ("Suman", 9, 11)

5. Write the code to delete the columns with label 'Marks', 'Class' and 'Rollno' from dataframe "DF".
Ans. DF = DF.drop(['Marks', 'Class', 'Rollno'], axis = 1)

6. Raman wants to change the column label "Salary" to "Salaries". Help him to write the code.
Ans. DF = DF.rename({"Salary" : "Salaries"}, axis='columns')

7. Raman wants to change the row label 0, 1, 2 to "One", "Two", "Three" respectively. Help him to write the code.

Ans. DF = DF.rename({0 : "One", 1 : "Two",2 : "Three"}, axis = 'index')

8. Consider the pandas dataframe "DF" given below:

	Arnab	Ramit	Samridhi	Riya	Mallika
Maths	90	92	89	81	94
Science	91	81	91	71	95
English	85	86	83	80	90
Hindi	97	96	88	67	99

Write the output of :
a. print(DF.loc["Maths"] > 90)
Ans.

Arnab	False
Ramit	True
Samridhi	False
Riya	False
Mallika	True

Name: Maths, dtype: bool

b. print(DF.loc[: , "Arnab"] > 90)
Ans.

Maths	False
Science	True
English	False
Hindi	True

Name: Arnab, dtype: bool

c. print(DF.loc[[True , False , True , False]])
Ans.

	Arnab	Ramit	Samridhi	Riya	Mallika
Maths	90	92	89	81	94
English	85	86	83	80	90

9. Consider the dataframe created ('DF') in Q. No. 8 above and answer the following questions:
a. Write the code to insert column "Amit" with values (90, 92, 95, 89) at position 5 (after Mallika)
Ans. DF.insert(5, "Amit" , [90, 92, 95, 89]) or DF["Amit"]=[90, 95, 80, 75]
b. Write the code to insert column "Amit" with values (90, 92, 95, 89) at position 2.
Ans. DF.insert(2, "Amit" , [90, 92, 95, 89])
c. Write the code to delete column "Riya" from dataframe "DF"
Ans. del DF["Riya"] or DF.drop("Riya", axis = 1)
d. Write the code to delete columns "Ramit" and "Riya" from dataframe "DF"
Ans. DF.drop(["Ramit" , "Riya"], axis = 1, inplace = True)
d. Write the statement to display marks of "Amit" in "Maths".
Ans. print(DF.loc["Maths" , "Amit"]) or print(DF.loc["Maths" : "Maths", "Amit" : "Amit"])

10. Write two differences between del statement and drop() function of pandas dataframe.
Ans. Differences are :

del	drop( )
(i) It can delete only column	(i) It can delete both row and column.
(ii) del can delete only one column at one time.	(ii) Multiple columns can be deleted by drop( )

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Data Visualization

Data visualization is the presentation of data in graphical format. To do so using script of Python we use one of the libraries available with Python, called matplotlib. Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python.


| Histogram | Scatter plot | Pie Plot | Bar Graph |
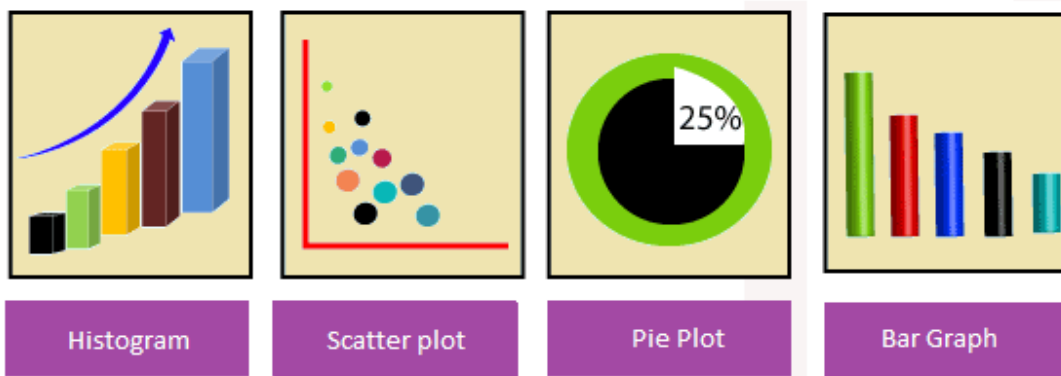
The various types of plotting:

Line Chart: Line graphs are plots where a line is drawn to indicate a relationship between a particular set of x and y values.
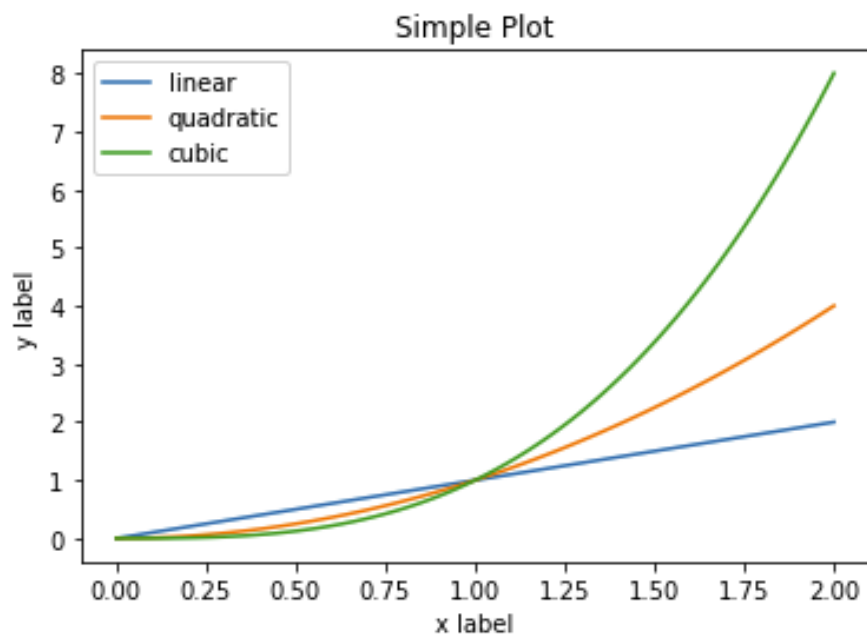
Scatter Plot: Scatter plots are the graphs that present the relationship between two variables in a data-set. It represents data points on a two-dimensional plane or on a Cartesian system. The independent variable or attribute is plotted on the X-axis, while the dependent variable is plotted on the Y-axis.

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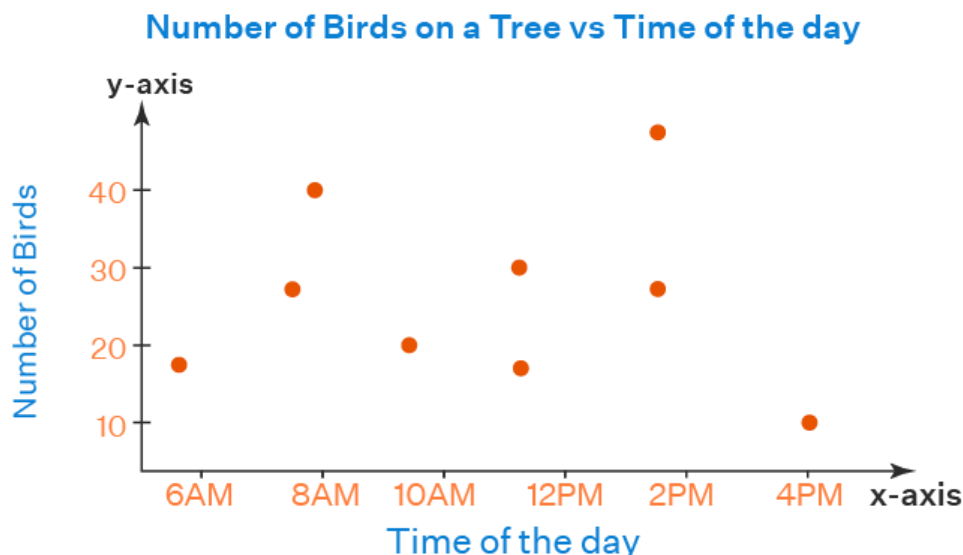
Bar Graph: A bar chart is used to show a comparison among different attributes, or it can show a comparison of items over time.
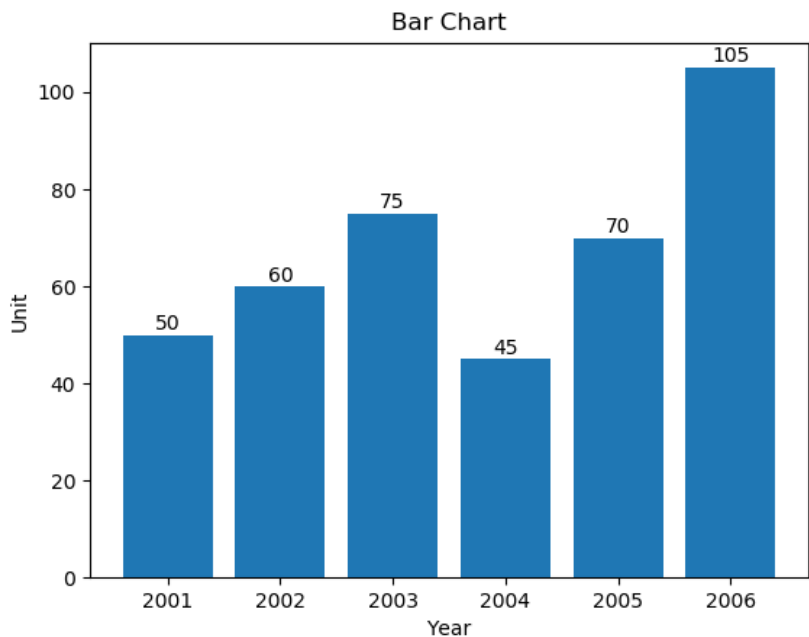
Histogram: Histograms provide a visual interpretation of numerical data by indicating the number of data points that lie within a range of values. The higher that the bar is, the greater the frequency of data values in that bin.
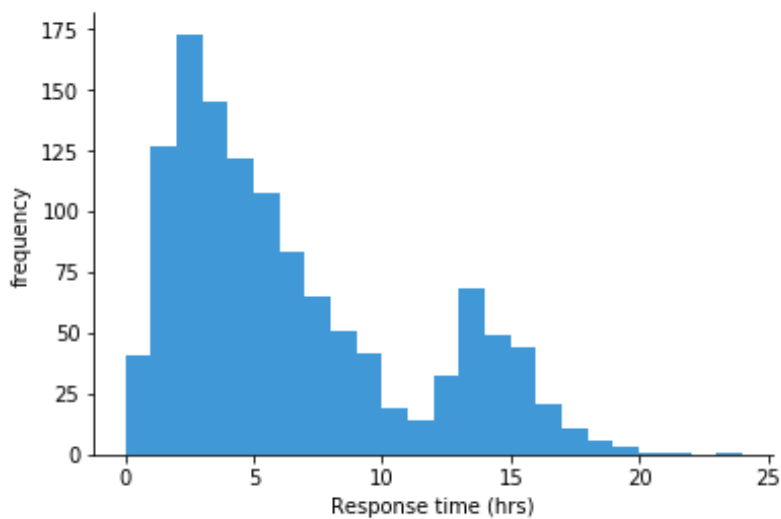
Pie Chart: A Pie Chart is a circular statistical graphic which is divided into slices to illustrate numerical proportion.
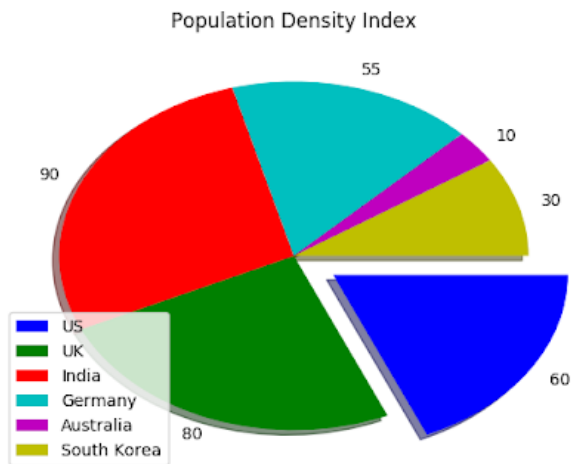
Frequency Polygon: A frequency polygon is a graph constructed by using lines to join the midpoints of each interval or bin.
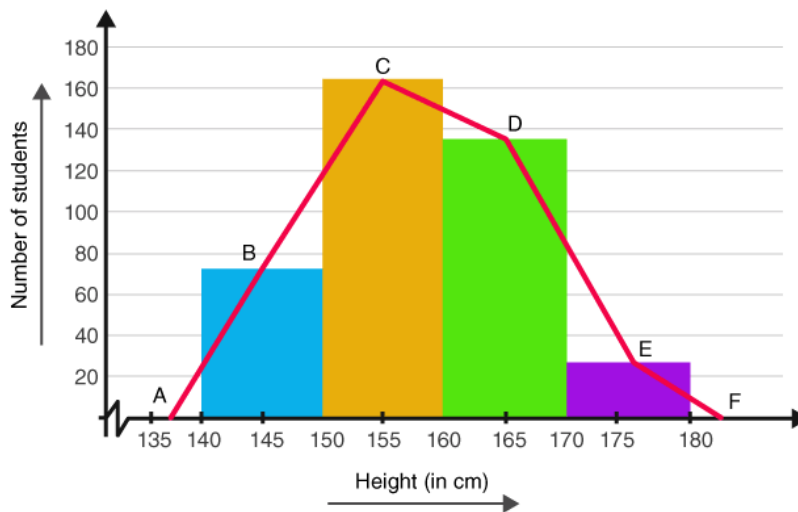
Box Plot: A box plot is a graphical representation of statistical data based on the minimum, first quartile, median, third quartile, and maximum. The term "box plot" comes from the fact that the graph looks like a rectangle with lines extending from the top and bottom.
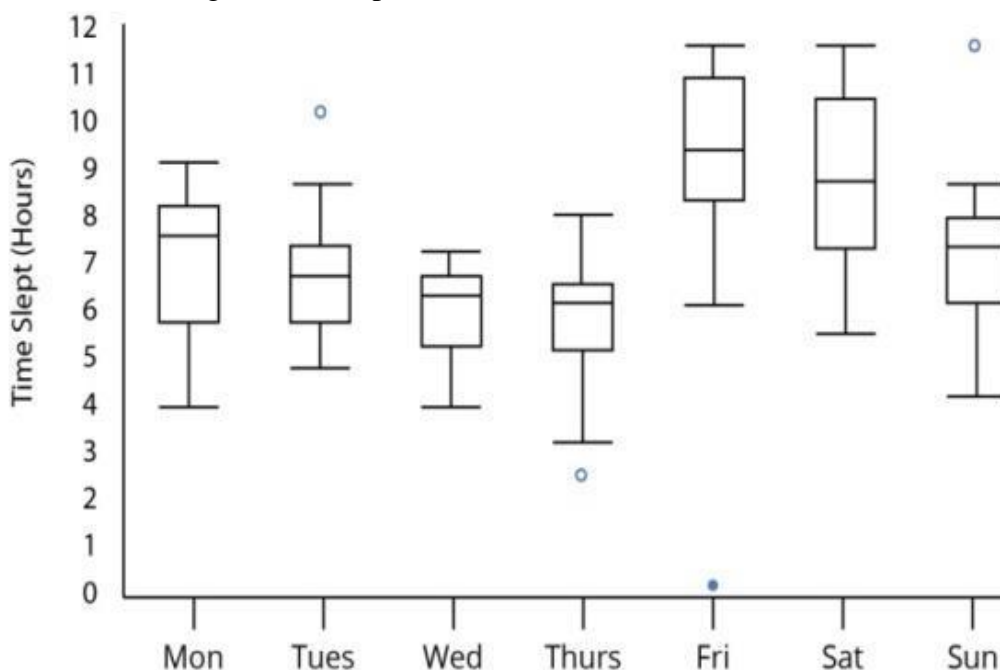
Functions to be remembered:

Function Name	Use	Syntax
xlabel(), ylabel()	To give labels for x axis and y axis	plt.xlabel('Year') plt.ylabel('No of visitors')
title()	To give chart title	plt.title('Park Analysis')
show()	To display the chart	plt.show()
legend()	To place a legend in the chart (an area describing the elements of the graph).	plt.legend() - label is expected with X and Y plt.legend(('sine', 'cosine'), loc='upper left', frameon=False) -customizing
xticks(), yticks()	TO SET ticks (the values used to show specific points on the coordinate axes. They can be numeric or string) label of x axis.	plt.xticks(index, label, fontsize = 6)
plot()	To plot the graph	plt.plot(X, Y, color = 'b')

		plt.plot(X, Y, color = 'green', linestyle = '-' , linewidth = 4)
scatter()	To create a scatter plot	plt.scatter(days, weight, c = 'red', marker = 'o', s = 75)
bar()	To create the bar chart	plt.bar(year, total_vehicles, align = 'center')
barh()	To create a horizontal bar chart	plt.barh(year, total_vehicles)
pie()	To create a pie chart.	slices = [7, 2, 2, 13] activities = ['sleeping', 'eating', 'working', 'playing'] cols = ['c', 'm', 'r', 'b'] plt.pie(slices, labels = activities, colors = cols, startangle=90,\ shadow = True, explode = (0, 0.1, 0, 0), autopct = '%1.1f%%') Note: Start angle = 90 means everything is rotated counter-clockwise by 90 degrees. Shadow gives the shadow effect to the slices. Explode to make slices appear out of the pie or offsetting a slice. Autopct string used to label the wedges with the numeric value. The value after point indicates how many numbers after the decimal point.
hist()	To create a histogram	plt.hist([5, 15, 25, 35, 45, 55], bins = [0, 10, 20, 30, 40, 50, 60], weights = [20, 10, 45, 33, 6, 8], edgecolor = "orange") Note: bins - block used to combine values before getting the frequency.
hist() [histtype = 'step']	To create a frequency polygon	plt.hist([5, 15, 25, 35, 15, 55], bins=[0, 10, 20, 30, 40, 50, 60], weights=[20, 10, 45, 33, 6, 8],\ edgecolor = "orange", histtype = 'step')
boxplot()	To create a boxplot	plt.boxplot(data, labels = ['pattern1', 'pattern2',\ 'pattern3'], patch_artist = True) Note: patch_artist attribute used to fill the boxplot with colours.
savefig()	To save a plot in a file	plt.savefig('bar_plot.pdf') plt.savefig('hist_plot. plt.savefig('scatter_plot.png')

Related questions from pre board papers

1. Create a horizontal bar graph of following data. Add suitable labels.

| City	Population
Delhi	23456123
Mumbai	20083104
Bangalore	18456123
Hyderabad	13411093

Ans:

import numpy as np

import matplotlib.pyplot as plt

Cities = ['Delhi', 'Mumbai', 'Bangalore', 'Hyderabad']

Population = [23456123, 20083104, 18456123, 13411093]

plt.barh(Cities, Population]

plt. ylabel('Cities')

plt.xlabel('Population')

plt.show()

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

```
import matplotlib.pyplot as p
x = [6, 7, 8, 9, 10]
y = [60, 40, 55, 30, 70]
p.title('Secondary Class Strength')
p.xlabel('Class')
p.ylabel('No. of students')
p.bar(x, y)
p.show()
```

Ans:
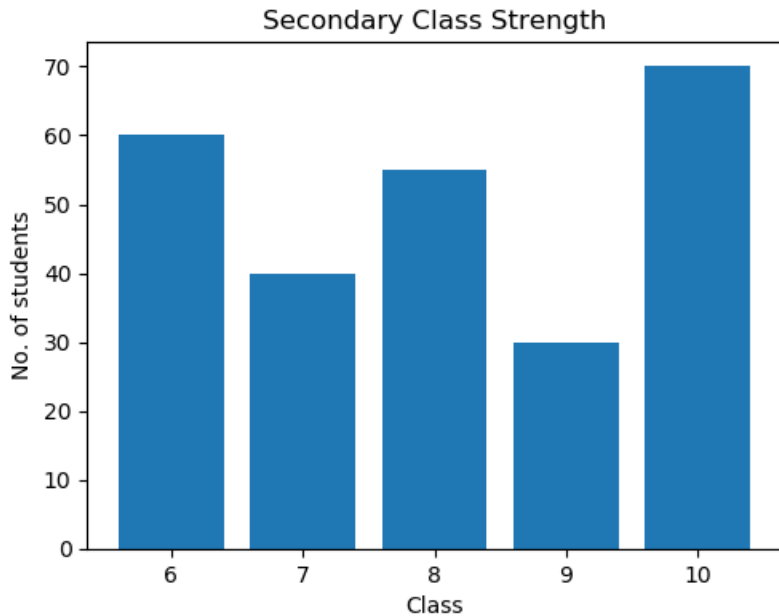
3. Fill in the blank with appropriate pyplot methods:

```
import matplotlib.pyplot as p
Year = [2000, 2002, 2004, 2006]
Rate = [21.0, 20.7, 21.2, 21.6]
_____          # To draw a line graph
p.xlabel('Year')
p.ylabel('Rate')
p.title('Fuel Rates in every Two Year')
_____("Graph1.pdf") # To save the graph
p.show()
```

Ans. p.plot(Year, Rate), p.savefig

4. Write a python program to draw a bar chart with the following information:

City	Population
Kolkata	78
Delhi	91
Kanpur	88
Patna	90
Banglore	82

The barchart should have the following features:
a) X-axis label should be City and Y-axis label should be Pollution
b) The title of the chart should be Pollution Index
c) The colour of the bars should be Red

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Ans:
```
import matplotlib.pyplot as plt
import numpy as np
city = np.array(['Kolkata', 'Delhi', 'Kanpur', 'Patna', 'Bangalore'])
pollution = np.array([78, 91, 88, 90, 82])
plt.xlabel('City')
plt.ylabel('Pollution')
plt.title('Pollution Index')
plt.bar(city, pollution, color = 'red')
plt.show()
```

5. Write a python program to draw a histogram with following information:
10, 15, 10, 10, 10, 15, 20, 20, 20, 20, 20, 25, 25
The histogram should have following information
a) X-axis label should be score and Y-axis should be Frequency
b) The title should be Frequency of Score
c) The colour of histogram should be blue with 10 bins
Ans:
```
import matplotlib.pyplot as plt
import numpy as np
arr = np.array([10, 15, 10, 10, 10, 15, 20, 20, 20, 20, 20, 25, 25])
plt.xlabel('Score')
plt.ylabel('Frequency')
plt.title('Frequency of Score')
plt.hist(arr, color = 'blue', bins = 10)
plt.show()
```

6. Ms. Sujata, a class teacher want to plot a bar graph for the name of days on x-axis and total students present on those days on y-axis to get the average weekly attendance. Complete the code to perform the following:
i. To plot the bar chart in statement1
ii. To show the chart in statement 2
```
import matplotlib.pyplot as pl
Days=['Mon', 'Tue', 'Wed', 'Thurs', 'Fri', 'Sat']
Present=[36, 37, 32, 31, 35, 39]
pl.bar(Days, Present)          #Statement1
pl.show()                     #Statement2
```
Ans. Statement1 -> pl.bar(Days,Present),   Statement2 -> pl.show()

7. Mr. Shiv wants to plot a scatter chart for the given set of values of subject on x-axis and number of students who opted for that subject on y-axis.
Complete the code to perform the following :
(i) To plot the scatter chart in statement 1
(ii) To display the scatter chart in statement 2
```
import matplotlib.pyplot as plt
x = ['Hindi', 'English', 'Math', 'Science', 'SST']
y = [10, 20, 30, 40, 50]
_____#Statement 1
_____#Statement 2
```
Ans: Statement 1 -> plt.scatter(x,y), Statement 2 -> plt.show()

8. MrAjay wants to plot a horizontal bar graph of the above given set of values with programming language on x axis and its popularity on y axis with following code.

Import matplotlib.pyplot as plt
x = ['Java', 'Python', 'PHP', 'JS', 'C#', 'C++']
popularity =[22.2, 17.6, 8.8, 8, 7.7, 6.7]
_____ #Statement1
plt.xlabel("Popularity")
plt.ylabel("Languages")
plt.show()
Complete the code by writing statement1 to print the horizontal bar graph with colour green
Ans: plt.barh(x, popularity, color = 'green')

9. Mr. Kamlesh wants to plot a Bar Graph for the given set of values of months on x-axis and number of participants who attended workshop in particular month on y-axis. Complete the code to perform the following:
(i) To plot the bar graph in statement1
(ii) To add label for x-axis as "No. of Students attended" in graph in statement2
import matplotlib.pyplot as plt
x = ['JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN']
y = [30, 20, 30, 50, 10, 60]
_____ #Statement 1
_____ #Statement 2
Ans: Statement1 -> plt.bar(x,y), Statement2 -> plt.xlabel("No. of Students attended")

10. Ms. Shalu wants to plot a Line Chart for the given set of values of months on x-axis and number of participants who attended workshop in particular month on y-axis. Complete the code to perform the following:
(i) To plot the Line Chart in statement1
(ii) To add Title as "Status of Workshop" in graph in statement2
import matplotlib.pyplot as plt
x = ['JAN', 'FEB', 'MAR', 'APR', 'MAY', 'JUN']
y = [30, 20, 30, 50, 10, 60]
_____ #Statement1
_____ #Statement2
Ans.
Statement1 -> plt.plot(x,y), Statement2 -> plt.title("Status of Workshop")

Unit-2: Database Query Using SQL

Revision of database concepts and SQL command covered in class XI

DATABASE: DBMS is a collection of interrelated data in arranged form and set of programs used to access those data.

Advantages of DBMS:

- Elimination of data redundancy
- Data consistency
- Sharing of data
- Data Integrity
- Data isolation
- Privacy and Security
- Improved Backup and Recovery

DATA MODELS:

Data models describe the structure of the database. There are four data models in DBMS:

1. Relational Data Model

2. Hierarchical Data Model

3. Network Model

4. Object Oriented Data Model

Relational Data Model: This database consists of a collection of table. These tables are called relations. A row in a table represents a relationship among a set of values.

- **Relation:** A relation is a table with columns and rows.
- **Tuple:** A row of a relation OR each row of a table.
- **Domain:** A set of values for the columns.
- **Attribute:** Column name of a relation.
- **Degree:** Total number of attributes/Column in a table
- **Cardinality:** Total number of tuples OR Number of rows in a table.
- **View:** A virtual table that does not exists but it is derived from other table

PRIMARY KEY: A column or Group of Column, which uniquely identify a Tuple in a Table, is called Primary Key. A Primary key cannot have null or duplicate values. A table can

have only ONE primary key but a Combination of columns can also act as primary key. Example Roll No., PNR Number, Aadhaar etc.

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

ALTERNATE KEY: A candidate key that is not the primary key or All candidate key other than Primary key is known as alternate key.

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

SQL:
- SQL stands for Structured Query Language.
- This is non-procedural Language.
- This is the common language for relational database. Means this language is used in MySQL.

MySQL:
- MySQL stands for My Structured Query Language.
- MySQL is freely available, Open source Relational Database Management System (RDBMS).
- It provides features for creating, storing, manipulating and accessing data stored in the form of database and their tables.

Advantages of MySQL:
1   Ease of Use: It is very easy to learn and use.
2   Performance: MySQL is fast and large volume of database can be handled.
3   Data Security: In has powerful mechanism for ensuring only authorized users have access the data.
4   Flexibility: MySQL can be linked to most of the other high level languages.
5   Portable: it is compatible with other languages like MS Access, Oracle etc.
6   Case Sensitive: MySQL is not case sensitive language.

Data Types:- Data types are rules that define what type of data may be stored in a column and how that data is actually stored. Data types used in MySQL categorized into following categories:

(i) Numeric –Integer, Float, Decimal, Numeric

(ii) String – Char, Varchar

(iii) Date -Date

(iv) Time -Time

NULL Values: If a column in a row has no value, then column is said to be null. NULLs can appear in a column if the column is not restricted by NOT NULL or Primary Key. You should use a null value when the actual value is not known.

Null and Zero is not equivalent. Any arithmetic expression containing a null always evaluates to null.

Example: 7 + null = null

7 + 0 = 7 Difference between null and zero.

Classification of SQL commands:

SQL commands are categorized into four sub languages:

(i)   Data Definition Language (DDL)

(ii) Data Manipulation Language (DML)

(iii) Data Query Language (DQL)

(iv) Transaction Control Language (TCL)

(v)   Data Control Language (DCL)

(i) Data Definition Language (DDL): It consist the commands for creating, manipulating, altering and deleting the table.

COMMANDS: CREATE, ALTER, DROP, RENAME, TRUNCATE, USE, SHOW

(ii) Data Manipulation Language (DML): It is used to manipulates data and for queries.

e.g. retrieval, insertion, deletion, modification of data stored in database.

COMMANDS: SELECT, INSERT IN TO, UPDATE, DELETE

Data Definition Language (DDL):

1. **CREATE DATABASE**

   To create a new database in the system.

   Syntax: CREATE DATABASE <DATABASE NAME>;

   e.g. **CREATE DATABASE** office;

2. **SHOW**

   To display the names of all the databases in the database system

   Syntax: SHOW DATABASES;

   e.g. SHOW Databases;

3. **USE**

   To open a database to work in it that database.

   Syntax: USE <DATABASENAME>;

   e.g. USE office;

4 **DROP DATABASE**

   To remove or delete a database.

   Syntax: DROP database <database name>;

   e.g: DROP database Office;

5. **ALTER TABLE**

   To modify the structure of the table. i.e. add a new attribute, delete an existing attribute, change to size and data type of a new attribute, renaming an attribute.

   ALTER TABLE EMP ADD DEPTID INT(5)   //To add new column DEPT

   ALTER TABLE EMP DROP DEPTID;   // To delete column DEPT

   ALTER TABLE EMP MODIFY ENAME VARCHAR(15);   //to change data type of a column

   ALTER TABLE EMP CHANGE ECITY CITY VARCHAR(25);   //to rename column

6. **CREATE TABLE**

   To create a new table.

   Eg. CREATE TABLE EMP (Ecode int(6), Ename varchar(30), Dept   varchar(30), city varchar(25), sex char(1), DOB Date, salary float(12,2));

Ecode	Ename	Dept	City	Sex	Dob	Salary

7. **SHOW TABLES**

   To display the names of all the databases in the database system

   Syntax: SHOW TABLES;

   e.g. SHOW TABLES;

8. **DROP TABLE**

   To remove or delete a table permanently.

   Syntax: DROP TABLE <table name>;

   e.g: DROP TABLE school;

9. **DESCRIBE /DESC**

   To view the structure of the table.

   Eg. DESC EMP;   or DESCRIBE EMP;

Data Manipulation Language (DML)

1. **INSERT INTO**

    To add new record or records into a table

    e.g. **INSERT INTO EMP VALUES**(101,"KARAN", "Sales", :Delhi", "M", "11-04-23",12000);

2. **DELETE**

    To delete rows/tuples from a table:

    e.g. **DELETE FROM EMP** WHERE ENAME = 'Vishal'

3. **UPDATE**

    To modify/update the values in the existing record.

    Eg: **UPDATE EMP set SALARY** = SALARY+ 5000 where Ecode =102;

4. **SELECT**

    To display all records or to retrieve a subset of rows and columns from one or more tables present in a database**.**

    SELECT * FROM EMP;

    SELECT * FROM EMP WHERE SALARY>1000;

    SELECT * FROM EMP WHERE SALARY BETWEEN 5000 AND 10000;

    SELECT * FROM EMP WHERE ENAME LIKE "%A";

SQL FUNCTIONS

A function is a special type of predefine command set that performs some operations and return a single value. The values that are provided to the functions are called parameters or arguments. Some common functions are as follows:-

Math Functions:

Mathematical functions perform operation over numeric value.

Function	Syntax	Description	Examples
POWER() POW()	POW(A,B)	Power () returns the value of a number raised to the power of another number mean return a power to B	Select POWER(2,5); Output: 32

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ROUND()	ROUND(N,D)	ROUND () function rounds a number to a specified number of decimal places Means Return number rounded to D place after decimals	Select round(134.29,1); Output: 134.3 Select round(135.375, 2) Output: 135.38
MOD()	MOD(Dividend , Divisor) MOD(M,N)	Mod () returns the remainder of one number divided by another. Return remainder M/N	Select MOD(16,5); Output: 1 Select MOD(10.5, 3); Output: 1.5

Text Functions:

FUNCTION	Syntax	Description	Examples
UPPER () UCASE()	UPPER(str) UCASE(str)	Upper/Ucase() function return string in small letters.	SELECT LCASE ("HELLO WORLD"); Output: hello world
LOWER() LCASE()	LOWER(str) LCASE(str)	Lower/Lcase() function return string in upper letters.	SELECT UPPER ("india") ; Output: INDIA
SUBSTR() MID()	SUBSTR (str, pos, len) MID(S,P,N)	Return the substring as specified Return N character of string S, beginning from P	SELECT SUBSTR ("HELLO WORLD",1,5); Output: HELLO SELECT MID ("COMPUTER",4,3); Output: PUT
LENGTH()	LENGTH("hello India")	Return the length of a string in bytes	SELECT LENGTH ("hello India") ; Output: 11 Include blank space also
LEFT()	SELECT LEFT ("string",n);	Will return n characters of a string from left side	SELECT LEFT ("HELLO WORLD",5); Output: HELLO

RIGHT()	SELECT RIGHT ("string",n);	Will return n characters of a string from right side	SELECT RIGHT ("HELLO WORLD",3); Output: RLD
INSTR()	SELECT INSTR ('string', 'sub str');	It returns the position of sub string in main string.	SELECT INSTR ("CORPORATE FLOOR",'OR'); Output: 2
LTRIM()	LTRIM (' HELLO ');	It will remove space from left side	SELECT LTRIM (" HELLO "); Output: 'HELLO '
RTRIM()	RTRIM (' HELLO ');	It will remove space from right side	SELECT RTRIM (" HELLO "); Output: " HELLO"
TRIM()	TRIM (' large ')	Removes leading and trailing space	SELECT LTRIM(" Apple ") ; Output-'Apple'

Date Functions:

FUNCTION	Syntax	Description	Examples
NOW()	NOW();	Will return the current date and time	SELECT NOW(); 2023-10-04 01:05:33
DATE()	DATE('date time');	Extract the date part of a date or date time expression	SELECT DATE("2023-10-04 01:05:33"); Output: 2023-10-04
MONTH()	MONTH('date');	Return the month from the date passed	SELECT MONTH ("2013-11-04"); **Output: 11**
MONTHNAME()	MONTHNAME('date');	Returns the full name of the month for date	SELECT MONTHNAME ("2008-02-03"); Output: 'February'
YEAR()	YEAR('date');	Return the year	SELECT YEAR("2023-11-04"); Output: 2023

| DAY() | DAY('date'); | Returns the day of the month for date, in the range 1to 31 | SELECT DAY("2023-07-04"); Output: 4 |
| DAYNAME() | DAYNAME('date'); | Returns the name of the weekday for date | SELECT DAYNAME ("2023-10-10"); Output: Tuesday |

Aggregate Functions:

Aggregate functions are functions that take a collection of values as input and return a single value. SQL offers five types of aggregate functions. Aggregate functions perform operation over set of Values Consider a table Emp having following records.

Table: Emp

Empno	Name	Dept	Salary
1	Raman	Purchase	35000
2	Satish	Sales	42000
3	Sonam	Finance	42000
4	Vijay	Sales	53000
5	Naveen	Finance	65000

Table: Emp1

Code	Name	Sal
E1	Mohak	NULL
E2	Anuj	4500
E3	Vijay	NULL
E4	Vishal	3500
E5	Anil	4000

FUNCTION	Syntax	Description	Examples
MAX()	MAX(column name/expression);	Returns the MAXIMUM of the values under the specified column/ expression	SELECT MAX(salary) from emp; Output: 65000 SELECT MAX(salary) from emp where dept="sales"; Output: 53000

MIN()	MIN(column name/expression);	Returns the MINIMUM of the values under the specified column/expression.	SELECT MIN(salary) from emp; Output: 35000 SELECT MIN(salary) from emp where dept="finance"; Output: 42000
AVG()	AVG(column name/expression);	Returns the SUM of the values under the specified column/expression. Null values are excluded while avg ()aggregate function is used	SELECT AVG(salary) from emp; Output: 47400.00 SELECT AVG(salary) from emp1; Output: 4000.00
SUM()	SUM(column name/expression);	Return the sum of the values in the given column	SELECT SUM(salary) from emp; Output: 237000
COUNT()	COUNT(column name); Count(Distinct column name)	Returns the COUNT of the number of values under the specified column/ expression. Null values not included	SELECT COUNT(Dept) from emp; Output: 5 Select count(Distinct Dept) from emp; Output: 3
COUNT(*)	COUNT(*);	It count the number of records in table emp	SELECT COUNT(*) from emp; Output: 5

COUNT() VS COUNT(*)

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

Count(*) – counts no. of records

NOTE: - The input to sum ( ) and avg( ) must be a collection of numbers, but the other functions can operate on non-numeric data types e.g. string

Group By: The Group by clause can be used in a select statement to collect data across multiple records and group the result one or more column. It group the rows on the basis of

the values present in one of the column and then aggregate functions are applied on any column of these groups to obtains the result of the query.

In some circumstance, we would like to apply the aggregate function not only to a single set of tuples, but also to a group of sets of tuples. We specify this wish in SQL using the group by clause.

The attributes given in the group by clause are used to form groups.

Example: - Find the average salary at each department.

Solution: - SELECT Dept, avg(salary) FROM EMP group by Dept;

Dept	Avg(salary)
Purchase	35000.00
Sales	47500.00
Finance	53500.00

Having: The HAVING clause is used in the SELECT statement to specify filter conditions for a group of rows or aggregates The HAVING clause is often used with the GROUP BY clause to filter groups based on a specified condition To filter the groups returned by GROUP BY clause, we use a HAVING clause

WHERE is applied before GROUP BY, HAVING is applied after (and can filter on aggregates) is applied before GROUP BY, HAVING is applied after (and can filter on aggregates)

Example:

Select <column1>, <column2>,..<column n>, <aggregate function(expression)> from table WHERE <condition> Group by[column 1, column2,… column n] Having[<condition 1, condition 2, condition n>];

SELECT DEPT, AVG(SALARY) FROM EMP GROUP BY DEPT HAVING AVG(SALARY)<45000;

Dept	Avg(salary)
Purchase	**35000.00**

Order By: the SQL order by clause is used to sort the result in a specific order using ORDER BY clause. The sorting can be done either in ascending or descending order. The default order is ascending.

Example:- Display the list of employees in descending order of employee code.

Example:

Select <column list> from <table name> [where <condition>] ORDER BY <column name> [ASC| DESC];

SELECT NAME FROM EMP ORDER BY NAME;

Name
Naveen
Raman
Satish
Sonam
Vijay

SELECT NAME, SALARY FROM EMP ORDER BY SALARY DESC;

Name	Salary
Naveen	65000
Vijay	53000
Satish	42000
Sonam	42000
Raman	35000

Suppose that we wish to list the entire emp relation in descending order of salary. If several employees have the same salary, we order them in ascending order by empno. We express this query in SQL as follows:-

SELECT EMPNO,SALARY FROM EMP ORDER BY SALARY DESC, EMPNO ASC;

empno	Salary
5	65000
4	53000
2	42000
3	42000
1	35000

- **Joins:** Join is query that combines rows from two or more tables, based on a common field between them.

- For joining the tables   more than one table is listed in the from clause of Select Command.
- E.g: SELECT * FROM EMP, DEPT;

Types of Joins:

1. Cartesian Product

2. Equi Join

3. Natural Join

- **Cartesian Product**
  - It return all possible concatenation of all rows from both table i e one row of First table is joined with all the rows of second table
  - Cartesian product join each row of one table with each row of another table
  - So if First table have 6 rows and second table have 4 rows then total number of rows in output will be 6 x 4 =24.

Example:

TABLE: DEPT

Deptno	Dname	LOC
10	SALES	CHENNAI
20	RESEARCH	KOLKATA
30	HR	DELHI

TABLE: EMP

Eno	Ename	Deptno
1	Suresh	10
2	Anoop	20

SELECT * FROM EMP, DEPT;

Eno	Ename	Deptno	Deptno	Dname	LOC
1	Suresh	10	10	SALES	CHENNAI
2	Anoop	20	10	SALES	CHENNAI
1	Suresh	10	20	RESEARCH	KOLKATA
2	Anoop	20	20	RESEARCH	KOLKATA
1	Suresh	10	30	HR	DELHI
2	Anoop	20	30	HR	DELHI

EQUI JOIN: When two tables are joined on the basis of equality.

Ex: Select <Column 1>, <Column2> FROM <Table1>, <table2> WHERE <table1. Primary Key Column= Table2. Foreign Key Column>
Select Eno, Ename,, edp.Deptno, Dname, LOC from Empl, Dept WHERE Emp.Deptno= Dept.Deptno;

Eno	Ename	Deptno	Dname	LOC
1	Suresh	10	SALES	CHENNAI
2	Anoop	20	RESEARCH	KOLKATA

Natural Join: Only one of the identical columns exists.

** The equi join and Natural Join are equivalent except that duplicate columns are eliminated in the Natural Join.

• The JOIN in which only one of the identical columns exists in called Natural Join It is similar to Equi join except that duplicate columns are eliminated in Natural join that would otherwise appear in Equi Join

•In natural join we specify the names of column to fetch in place of which is responsible of appearing common column twice in

MULTIPLE CHOICE QUESTIONS (MCQ)-1 Mark)

1	Write the output of the following SQL command. select round(69.88,-1); **a.** 69.88 b. 69.8 c. 70 d. 69.0
2	The round() function in MySql is an example of _____. a. Math function b. Text function c. Date Function d. Aggregate Function
3	If column "MARKS" of table STUDENT contains the data set (20,50, NULL,12, 73) , what will be the output after execution of the following query. **SELECT MAX(MARKS) -COUNT(MARKS) FROM STUDENT;** **a.** 61 b. 95 c. 123 d.69
4	If column "**salary**" of table employee contains the data set (2000,500, 4300,2000, 500) , what will be the output after execution of the following query. **SELECT COUNT(DISTINCT SALARY) FROM EMPLOYEE ;** **a.** 5 b. 0 c. 3 d.1

5	Consider the string "Preboard Exam 2023". Which among the following SQL command will gives the last 4 characters of the string as output?
	
	 (i). SELECT right("Preboard Exam 2023",4);
	
	(ii). SELECT left("Preboard Exam 2023",4);
	
	(iii). SELECT substr("Preboard Exam 2023",14,4);
	
	(iv). SELECT substr("Preboard Exam 2023",15,4)
	
	  a. option (i) b. option (i) and (iii)
	
	  c. option (i) and (iv) d. option (ii)

6	The mid( ) function in MySQL is an example of _____.
	
	  a. Math function b. Text function
	
	  c. Date Function d. Aggregate Function

7	In SQL, which function used to display current date and time? **a.** Date( ) b. Time( ) c. Current( ) d. Now( )
8	Which type of values will not be considered by SQL while executing the following statement? SELECT COUNT(column name) FROM inventory; **a.** Numeric value b. text value c. Null value d. Date value

9	Neha, a Database Administrator, needs to display the average pay of workers from those departments which have more than five employees. He is experiencing a problem while running the following query: SELECT DEPT, AVG(SAL) FROM EMP WHERE COUNT(*) > 5 GROUP BY DEPT;
	
	 Which of the following is a correct query to perform the given task?
	
	 a. SELECT DEPT, AVG(SAL) FROM EMP WHERE COUNT(*) > 5 GROUP BY DEPT;
	
	 b. SELECT DEPT, AVG(SAL) FROM EMP HAVING COUNT(*) > 5 GROUP BY DEPT;
	
	 c. SELECT DEPT, AVG(SAL) FROM EMP GROUP BY DEPT WHERE COUNT(*) > 5;
	
	 d. SELECT DEPT, AVG(SAL) FROM EMP GROUP BY DEPT HAVING COUNT(*) > 5;

10	If column "Fees" contains the data set (5000,8000,7500,5000,8000), what will be the output after the execution of the given query? SELECT SUM (DISTINCT Fees) FROM student; a. 20500 b. 10000 c. 20000 d. 33500
11	Which SQL statement do we use to find out the total number of records present in the table ORDERS? a. SELECT * FROM ORDERS; b. SELECT COUNT (*) FROM ORDERS; c. SELECT FIND (*) FROM ORDERS; d. SELECT SUM () FROM ORDERS
12	Which of the following SQL functions does not belong to the Math functions category? a. POWER() b. ROUND() c. LENGTH() d. MOD()
13	What will be printed by the given query? SELECT LENGTH("WIN.NER"); a. 7 b. 6 c. 8 d. 9
14	Predict the output of the following query: 1 SELECT MOD (9,0); a. 0 b. NULL c. NaN d. 9
15	With reference to SQL, identify the invalid data type. a. Date b. Integer c. Varchar d. Month
16	In SQL, the equivalent of UCASE() is: a. UPPERCASE () b. CAPITALCASE() c.UPPER() d.TITLE ()
17	In SQL, this function returns the time at which the function executes: a. SYSDATE b. NOW c. CURRENT d. TIME

18	The correct SQL from below to find the city, temperature in increasing order of all cities.
	A. SELECT city FROM weather order by temperature;
	B. SELECT city, temperature FROM weather;
	C. SELECT city, temperature FROM weather ORDER BY temperature;
	D. SELECT city, temperature FROM weather ORDER BY city;
19	Where and Having clauses can be used interchangeably in SELECT queries?
	a. True b. False c. Only in views d. With order by
20	Write the output of the following SQL command:
	select truncate(15.88,1);
	a. 15.88 b. 15.8 c. 15.9 d. 16
21	Which SQL statement is used to display all the data from product table in the decreasing order of price?
	A. SELECT * FROM PRODUCT;
	B. SELECT * FROM PRODUCT ORDER BY PRICE;
	C. SELECT * FROM PRODUCT ORDER BY PRICE DESC;
	D. SELECT * FROM PRODUCT ORDER BY DESC;
22	In SQL, which function returns the weekday name for a given date.
	a. DAY b. DAYNAME c. NAME d. DNAME
23	Which clause is used with "aggregate functions"?
	a. GROUP BY b. SELECT c. WHERE d. Both A and B
24	Write output of the following MySQL command:
	SELECT SUBSTR("Informatics Practices",6,9);
	a. matics Pr b. aticsPra c. maticsPra d. None
25	Select the proper output for the following query from the options: .
	select right (substr('Innovative ideas',2,7),3);
	a.vati b. ati c.itav d. ita
26	Identify the SQL function which returns output as a group of characters.
	a .NOW() b. MONTHNAME() c. MONTH() d. WEEKNAME()
27	Predict the output of the following query:
	SELECT LCASE (MONTHNAME ('2023-03-05'));
	a. May b. March c. MAY d. MARCH

ANSWER OF MCQ:

1	C	7	D	13	A	19	B	25	B
2	A	8	C	14	B	20	B	26	B
3	D	9	D	15	D	21	C	27	D
4	C	10	A	16	C	22	B		
5	C	11	B	17	A	23	A		
6	B	12	C	18	D	24	A		

SHORT ANSWER TYPE QUESTION:

1	Ajay is working with a table Employee. The table contains the following columns: Code, Name, Salary, DeptCode He wants to display the maximum salary department wise. He wrote the following query: **Select Deptcode, max(salary) from Employee;** But he did not get the desired result. Rewrite the above query with necessary changes to help him get the desired result
2	What is the difference between the order by and group by clause when used along with the select statement? Explain with an example
3	Riya, a database administrator needs to display house wise total number of records of 'Computer' and 'Electronics' Department. She is encountering an error while executing the following query: **SELECT Department, COUNT (*) FROM Employee GROUP BY Department WHERE Department='Computer' OR Department= 'Electronics";** Help her in identifying the reason of the error and write the correct query by suggesting the possible correction (s).
4	What is the purpose of WHERE clause in SQL? Explain with the help of suitable example

5	Predict the output of the following queries:
	
	 i. select instr('exams@cbse.nic.in','.');
	
	 ii. select substr('exams@cbse.nic.in',5,5);
	
	 iii. select left('exams@cbse.nic.in',4);

6	Consider the given SQL string:
	"12#All the Best!"
	Write suitable SQL queries for the following:
	i. Returns the position of the first occurrence of the substring "the" in the given string.
	ii. To extract last seven characters from the string
7	What are aggregate functions in SQL? Name any two aggregate functions.
8	Write MySQL statements for the following:
	i. To create a database named HEALTH.
	ii. To create a table named Nutrients based on the following specification
9	What is the purpose of Order By clause in SQL? Explain with the help of suitable example.
10	Explain the following SQL functions using suitable examples.
	i. UCASE()
	ii. TRIM()
	iii. MID()
	iv. DAYNAME()
	v. POWER()

Table specification for question 8:

Column name	Data Type	Constraints
Food_Name	Varchar(20)	Primary Key
Calorie	Integer	

ANSWER: SHORT ANSWER TYPE QUESTION:

1	SELECT DeptCode, max(Salary) FROM Employee GROUP BY Deptcode;
2	The order by clause is used to show the contents of a table/relation in a sorted manner with respect to the column mentioned after the order by clause. The contents of the column can be arranged in ascending or descending order.
	The group by clause is used to group rows in a given column and then apply an aggregate function eg max(), min() etc on the entire group.
3	The problem with the given SQL query is that WHERE clause should not be used with Group By clause. To correct the error, HAVING clause should be used instead of WHERE.
	Corrected Query:
	SELECT Department, COUNT (*) FROM Employee GROUP BY Department HAVING Department='Computer' OR Department= 'Electronics";

4	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. For Example: To see details of employees whose ecode is e001 or e006 then query would be: Select * from employee WHERE ecode in ('e001','e006');
5	i. 11 ii. 5@cbs iii. exam
6	i. SELECT INSTR("12#All the Best!","the"); ii. SELECT RIGHT("12#All the Best!",7);
7	Aggregate functions: These 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. Max(), Min(), Avg(), Sum(), Count() and Count(*) are few examples of multiple row functions.
8	i. CREATE DATABASE HEALTH; ii. CREATE TABLE NUTRIENTS(FOOD_NAME VARCHAR(20) PRIMARY KEY,CALORIES INTEGER);
9	Order By clause: The ORDER BY command is used to sort the result set in ascending or descending order. The following SQL statement displays all the customer's names in alphabetical order: SELECT Cname FROM Customers ORDER BY Cname;
10	1.**UCASE**(): It converts the string into upper case. **Example:** SELECT UCASE('welcome world'); **Output:** WELCOME WORLD **2. TRIM**(): It removes the leading and trailing spaces from the given string. **Example:** SELECT TRIM(' Welcome world '); **Output:** Welcome world

	3. **MID():** It extracts the specified number of characters from given string.
	Example:
	SELECT MID(' Welcome world,4,,4);
	Output:
	Come
	4. **DAYNAME():** It returns the weekday name for a given date
	Example:
	SELECT DAYNAME('2022-07-22');
	Output:
	Friday
	5. POWER(): It returns the value of a number raised to the power of another number.
	Example:
	SELECT POW(6,2);
	Output:
	36

CASE STUDY BASED/LONG ANSWER TYPE QUESTIONS:

1	Write outputs for SQL queries (A) to (C) which are based on the given table GAME.
	<table><tr><th>GID</th><th>NAME</th><th>DATEOFGAME</th><th>UNDER</th><th>WINNER</th></tr><tr><td>1</td><td>JUDO</td><td>2022-10-17</td><td>17</td><td>RAMESH</td></tr><tr><td>2</td><td>BADMINTON</td><td>2022-5-18</td><td>14</td><td>KIRTI</td></tr><tr><td>3</td><td>JUDO</td><td>2022-8-18</td><td>19</td><td>KAMAL</td></tr><tr><td>4</td><td>TAEKWONDO</td><td>2021-7-20</td><td>14</td><td>SADIQ</td></tr><tr><td>5</td><td>CHESS</td><td>2021-5-6</td><td>17</td><td>ALANKAR</td></tr></table>
	A. Select name, under, winner from GAME where month(dateofgame)>7;
	B. Select lcase(mid(winner,2,3)) from GAME where NAME like "%O";
	C. Select mod(under, month(dateofgame)) from GAME where NAME="JUDO";
2	Write the output of the queries (a) to (d) based on the table, TECH_COURSE given below:

Table: TECH_COURSE

CID	CNAME	FEES	STARTDATE	TID
C201	Animation and VFX	12000	2022-07-02	101
C202	CADD	15000	2021-11-15	NULL
C203	DCA	10000	20220-10-01	102
C204	DDTP	9000	2021-09-15	104
C205	Mobile Application Development	18000	2022-11-01	101
C206	Digital Marketing	16000	2022-07-25	103

A. SELECT DISTINCT TID FROM TECH_COURSE;

B. SELECT TID, COUNT(*), MIN(FEES) FROM TECH_COURSE GROUP BY TID HAVING COUNT(TID)>1;

C. SELECT CNAME FROM TECH_COURSE WHERE FEES>15000 ORDER BY CNAME;

D. SELECT AVG(FEES) FROM TECH_COURSE WHERE FEES BETWEEN 15000 AND17000;

---

3 | Consider the table Hospital given below showing information of patients. Write commands in MySQL for (i) to (iii)

No	Name	Age	Department	DateOfAdm	Charges	Sex
1	Sandeep	64	Surgery	1997-02-23	400	F
2	Ravina	24	Orthopedic	1998-01-20	200	F
3	Karan	45	Orthopedic	1997-02-10	200	M
4	Tarun	12	Surgery	1998-01-01	300	F
5	Zubin	36	ENT	1998-01-12	250	M
6	Ketaki	16	ENT	1998-02-12	300	F

i. To show all information of patients who are in Orthopedic department from hospital table in descending order of their age.

ii. Increase the charges of male patient in ENT department by 4%.

iii. Display a report listing name, age, charges and amount. Amount is charges + VAT as 2% on charges, name the column as total charges

---

4 | "XYZ" Company conducts workshops for employees of organizations. The company requires data of workshops that are organized. As a database administrator you have decided that:

Name of the Database: **ABCINC**

Name of the Table: **WORKSHOP**

Attributes of Table 'Workshop' are as follows:

Field	Type
WorkshopId	integer
Title	Varchar(50)
DateWorkshop	Date
NumSpeakers	Integer

Table : WORKSHOP

WorkshopId	Title	DateWorkshop	NumSpeakers
1001	Robotics	2020-03-21	3
1002	AI	2020-05-24	4
1003	Humanoids	2020-07-15	3
1004	Block Chain	2020-04-25	5
1005	Cloud	2020-03-03	4

a. Identify the attribute best suited to be declared Primary Key

b. Write a command to display details of workshop whose Title ends with letter **s**.

c. Write SQL command to update/modify the Number of Speakers from 3 to 4 for Humanoids Workshop.

d. Write SQL command to display details of workshops to be conducted in 3rd month (march).

| 5 | Consider the below mentioned table of '**CLOTH**' |

Write the SQL commands for the following:

a. Display first three letters of all values in DESCRIPTION column e.g. 'FRO' for 'FROCK'

b. Display number of cloths of each Fabric.

c. Display average price of cloths of each Fabric.

| 6 | Write suitable SQL query for the following: |

A. Display 4 characters extracted from 3rd character onwards from string "IMPOSSIBLE".

B. Display the position of occurrence of string "GO" in the string "LET"s GO to GOA".

C. Round off the value 257.75 to nearest ten rupees.

	D. Display the remainder of 18 divided by 5. **E.** Remove all the leading and trailing spaces from a column passwd of the table "USER".
7	i. Display 7 characters extracted from the 7th left character onwards from the string 'INDIA SHINING'. ii. Display the position of the occurrence of string 'COME' in the string 'WELCOME WORLD'. iii. Round off the value 23.78 to one decimal place. iv. Display the remainder of 100 divided by 9. v. Remove all the expected leading and trailing spaces from a column userid of the table 'USERS'.

8	Akash wants to find the following data from mysql using functions. What commands he will write to
	
	   I. Find the name of the day of the current date.
	
	   II. Display 'infomatics practices' in capital letter.
	
	  III. Display the name of the month in which you are giving yours pre boards.
	
	  IV. To Round off the value 23.7856 to two decimal place.
	
	   V. Display the remainder of 45 divided by 9.

9	Reena is working with functions of MySQL. Explain her following: i. What is the purpose of now () function? ii. How many parameters does it accept? iii. What is the general format of its return type?
10	Consider the following table – Persons | PID	PName	DOB	Gender	Address	Salary
---	---	---	---	---	---
P101	RRajkumar	1977-01-12	M	Delhi	45678.99
P102	S Singh	1965-12-31	M	Delhi	78954.50
P103	R Shukla	1987-11-23	F	Mumbai	23456.00
P104	K Kamal	1999-05-21	M	Mumbai	43222.99
P105	A Bose	1989-01-01	F	Kolkota	31000.00	 Based on above table write queries in MySQL for the following: i. To display records in ascending order of salary. ii. To remove the decimal values from salary. iii. To display sum of Salary of Persons whose Address is Delhi. iv. To display the details of person whose name starts with letter 'R' or ends with letter 'e'.

ANSWERS:

1	A. Name Under Winner Judo 17 RAMESH Judo 19 KAMAL B. lcase(mid(winner,2,3)) ame ama adi C. mod(under, month(dateofgame)) 7 3

2	A. Distinct TID
	
	101
	
	102
	
	103
	
	104
	
	B. TID COUNT(*) MIN(FEES)
	
	   101 2 12000
	
	C NAME
	
	  Digital Marketing
	
	  Mobile Application Development
	
	D. AVG(FEES) 15500

3	i. Select * from hospital where Department= "Orthopedic" order by age DESC; ii. Update Hospital set charges=Charges+.04*Charges where Sex='M' iii. Select Name, Age, Charges, Charges+.02*Charges as 'Total Charges' from Hospital;
4	a. WorkshopId b. Select * from workshop where title like "%s"; c. UPDATE WORKSHOP SET NUMSPEAKERS = 4 WHERE TITLE=' HUMANOIDS'; **d.** Select * from workshop where month(DateWorkshop)=3;

5	a) Select substr(description,1,3) from cloth;
	b) select fabric , count(*) from cloth group by fabric;
	c) select fabric , avg(price) from cloth group by fabric;
6	A. select mid("IMPOSSIBLE", 3, 4);
	B. select INSTR("LET"s GO to GOA", "GO");
	C. select round(257.75, -1);
	D. select mod(18, 5);
	E. select trim(passwd) from USER
7	i. select mid('INDIA SHINING',7,7);
	ii. select INSTR('WELCOME WORLD','COME');
	iii. select round(23.78,1);
	iv. select mod(100,9);
	v. select trim(userid) from users
8	i. select dayname(now());
	ii. Select UPPER('infomatics practices');
	iii. Select monthname(now());
	iv. Select round(23.7856,2);
	v. Select mod(45,9);
9	i. It returns the current date and time.
	ii. None
	iii. The return type for NOW() function is either in 'YYYYMM-DD HH:MM:SS' format or YYYYMMDDHHMMSS. format, depending on whether the function is used in a string or numeric context.
10	i. select * from Persons order by salary;
	ii. update Persons set salary = round(salary, 0);
	iii. select sum(salary) from Persons where Address = "Delhi";
	iv. select * from Persons where PName like "R%e" ;

XII INFORMATICS PRACTICES
UNIT - 3

INTRODUCTION TO COMPUTER NETWORKS

THIS UNIT HAS 10 MARKS WEIGTAGE OUT OF 70 MARKS

COMPUTER NETWORKS:
A computer network is a set of nodes (Computers and other networking devices) that are connected through communication media for the purpose of communication and sharing resources (hardware / software) among the users

Advantages of Networks:

1. Facilitate Communication through email, messages, video conferencing
2. Share hardware devices like a printer or scanner
3. Enable file sharing
4. Share softwares
5. Sharing of Information

TYPES OF NETWORK

| NET WORK	FULL FORM	DEFINITION AND EXAMPLE	AREA COVERED	TECHNOLOGY
PAN	PERSONAL AREA NETWORK	IT IS FORMED WHEN USER MAKE A NETWORK OF ITS PERSONAL DEVICES LIKE MOBILE PHONES, LAPTOPS, DESKTOPS	UPTO 10 METER	INFRARED, BLUETOOTH
LAN	LOCAL AREA NETWORK	SUCH NETWORKS ARE CONFINED TO A SINGLE BUILDING, OFFICE ETC. E.G NETWORK WITHIN A SCHOOL	UPT0 10 KM	ETHERNET, WI-FI
MAN	METROPOLITAN AREA NETWORK	SUCH NETWORKS ARE SPREAD OVER A WHOLE CITY. E.G NETWORK OF ALL BRANCHES OF SCHOOL IN A DELHI , CABLE TV NETWORK	UPTO 100KM RADIUS	OPTICAL FIBER, RADIO WAVE, MICROWAVE
WAN	WIDE AREA NETWORK	SUCH NETWORKS ARE SPREAD IN WHOLE COUNTRY AND AT WORLD LEVEL. E.G INTERNET	ENTIRE COUNTRY OR GLOBE	ROUTER, GATEWAY

NETWORKING DEVICES

1. **MODEM (Modulator Demodulator)** :- MODEM is a device that Converts analog signal to digital (known as modulation) and digital signal to analog (known as demodulation)
2. **HUB** :- It acts as a central device for connecting several devices in network. It broadcast all the signals to all computers in a network. It comes with 8,16,24,32 ports ect.
3. **SWITCH** :- It acts as a central device for connecting several devices in network. It is an intelligent device that send the message to the recipient only. It comes with 8,16,24,32 ports ect.
4. **REPEATER:**- It is used to regenerates/amplify/restore the signal . It is required after 100 meters in twisted pair cable and after 500 meters in coaxial cable.
5. **ROUTER** :- It is a networking device which chooses the best optimal path from available pats to send the signals. It interconnects different networks .
6. **GATEWAY :**- This device is used to connect two dissimilar networks to resolve their protocol differences.

NETWORKING TOPOLOGY:- It is a physical layout of computers/nodes in a network.

Types of Topology:-

STAR TOPOLOGY:- When all the nodes are connected in a network through a central device called HUB/SWTICH it is called star topology.
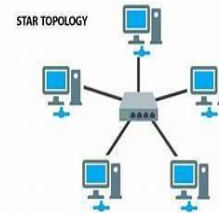
Advantages:-

1. Easy to install
2. If one link fails the network can still function

Disadvantages:-

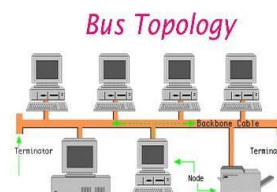1. Everything depends on the hub. If HUB fails the whole network fails

BUS TOPOLOGY:- In this topology all the nodes are attached to a single backbone cable.
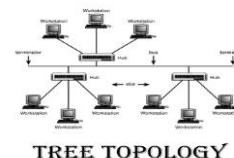
Advantages:-

1. Easy to install
2. Minimal Cable

Disadvantages:-

1. Difficult reconnection
2. Difficult to find the problem

TREE TOPOLOGY:- In this topology all the nodes are attached to a single backbone cable.

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Advantages:-

1. It is scalable.
2. Easier fault identification and isolation

Disadvantages:-

1. Maintenance of the network may be an issue when the network spans a great area
2. if the backbone fails, the entire network is crippled.

MESH TOPOLOGY:- In this topology all the nodes are directly connected to all other nodes in a network

Advantages:-

1. Avoid traffic since each link can carry its own data and none   are being shared Disadvantages:-
2. If one link breaks, the rest of the network is still functional.
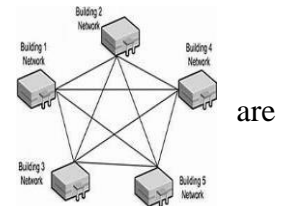
Disadvantages:-

1. A lot of cables are needed
2. Too many cables means complex network

INTRODUCTION TO INTERNET:-

Internet means network of networks. It is a WAN type network that is spread in whole world. It is a client server architecture network. It provides us services like EMAIL, WEBSITES, FILE SHARING, ENTERTAINMENT SOURCE ETC.

URL:- (Uniform Resource Locator) This is the address of any resource on internet.

E.g :- https://abc.com/study/cs.pdf

WWW:- (World Wide Web) This is web of multimedia (Text, Pictures, Audio , Videos) information   i.e collections of websites or webpages stored in web servers.

EMAIL:- (Electronic Mail) :- It is service of Internet in which messages can be sent to any person electronically over computer network. It requires email account.

CHAT:- - Online textual talk is called chatting.

 VOIP :- (Voice Over Internet Protocol)- It is technology that allows you to make voice calls using a Internet connection instead of a regular (or analog) phone line.

WEBSITE :- It is Collection of related web pages on a web server and are linked together.

E.g   https://kvsangathan.nic.in/

WEBPAGE:- It is a HTML/Web document that is opened in web browser software. It may contain multimedia information like Text, Pictures, Audio and Video etc.

STATIC WEBPAGE:- These are web pages that remain the same until someone changes it manually

DYNAMIC WEBPAGE:- These are web pages that are changed automatically with time, place and preferences of users.

WEB BROWSER:- It is a software/application that is used to open website on a client/User computer system. E.g Internet explorer, Google Chrome, Mozilla Firefox, opera, safari etc.

WEB SERVER:- It is the software that is installed on server computer and it sends the webpages to client computer requested through web browser. E.g Apache Tomcat, IIS

WEBSITE HOSTING:- It is the system where a WEB HOSTING provider stores and maintains all files of website and applications on a server to make it accessible to end users on internet.

ADD-ONS:- An add-on is a program utility or physical device that can be added to a system to enhance its capabilities.

PLUG-INS:- It is a small add-on software used to enhance the functionality of a desktop program or a web application.

COOKIES:- These are the small text files created by web server on clients computer when user visit a website.

Multiple Choice Questions (MCQ)

1) Physical Layout of computers in a network is called _____.
    a) Network   b) Topology   c) ftp   d) IP Address

2) A computer that facilitates the sharing of data, software and hardware resources on the network is called_____.
    a) Client   b) Dump Terminal   c) Printer   d) Server

3) Which is the device that that unicast the data signal in the network rather than broadcast?
    a) Repeaters   b) Switch   c) Hub   d) Bridge

4) Mr Z of Class X is sending some media files on Mr Y's mobile over Bluetooth, which type of networks he formed by them:
    a) LAN   b) WAN   c) MAN   d) PAN

5) The network device that amplifies and restores the signal for long distance transmission?
    a) Repeater   b) Switch   c) Hub   d) Router

6) The collection of the hyperlinked documents on the internet is called _____?
    a) XML   b) Email   c) WWW   d) Internet

7) The location of document on internet is called its _____?
    a) Email   b) IP   c) Protocol   d) URL

8) Identify among the following the network device used to connect two dissimilar types of networks.
    a) Switch   b) Hub   c) Bridge   d) Gateway

9) The Topology in which all the computers are connected to a main backbone cable is called?
    a) star   b) bus   c) mesh   d) Tree

10) Internet is which type of network?
    a) WAN   b) PAN   c) MAN   d) LAN

11) Which device converts digital data to analog and vice versa?
    a) Modem   b) Hub   c) Switch   d) Router

12) Full form of VOIP is ?
a) VIDEO OVER INTERNET PROTOCOL   b) VOICE OVER INFORMATION PROTOCOL
    c) VOICE OVER INTERNET PROTOCOL d) NONE OF THE ABOVE

13) The web page whose contents remain same until changed manually is called?
    a) Static   b) Dynamic   c) Fix   d) Still

14) which amongst the following is not an example of browser?
    a) Chrome   b) Firefox   c) Avast   d) edge

15) Electronic mail cannot be used for
    a) Sending documents   b) Sending attachments
    c) Sending bulk data (say over 2GB)   d) Sending messages

16) A _____ is a device that connects the organization's network with the outside world of the Internet.   [CBSE Sample paper]
    a) Hub   b) Modem   c) Gateway   d) Repeater

17) Television cable network is an example of: [[CBSE Sample paper]
    a) LAN   b) WAN   c) MAN   d) Internet

18) Which protocol allows us to have voice calls over the internet?
    a) HTTP   b) VoIP   c) Video Chat   d) SMTP

19) An online activity that enables us to publish website or web application on the internet
    a) Web server   b) Web Browser   c) Web Hosting   d) None

20) Small text files created by website on clients computer for storing the information of user is called:
    a) Web Page   b) Cookies   c) Text File   d) Server

ASSERTION AND REASONING based questions

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

Q1   Assertion (A): Each website has a unique address called URL.
      Reasoning (R): It is Uniform Resource Locator and a correct example of it   is
      http://mypage.htm/google.com

Q2   Assertion (A): - VoIP makes audio and video calls possible from any internet
      connected device having a microphone and speakers.
      Reasoning (R): - VoIP is possible if both caller and receiver have the right software
      and hardware to speak to one another

Q3   Assertion(A): Incognito browsing opens up a version of the browser that will track
      your activity
      Reasoning(R): Incognito browsing is useful when entering sensitive data

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

Q5   Assertion (A): - MODEM stands for modulator-demodulator.
      Reasoning (R): - It is a computer hardware device that converts data from a digital
      format to analog and vice versa.
            [CBSE Sample paper]

Q6   Assertion (A): - Repeater is device to regenerate a digital signal.
      Reasoning (R): - It has to be installed when data is to be sent on long distance
      through wired media to avoid loss of signal.

Q7   Assertion (A): - Cookies are plain text files.
      Reasoning (R): - Cookies are not automatically created.

Q8   Assertion (A): - Dynamic webpages are those that are changed as per the location ,
      time and preferences of user.
      Reasoning (R): - Dynamic webpages are manually changed .

Q9   Assertion (A): - Internet is a client server architecture of network
      Reasoning (R): - Clients provide the servers   the required information and data.

Q10   Assertion (A): - There is a centralized control in case of Star topology.
      Reasoning (R): - If Hub/Switch fails then whole network is failed.

MCQ ANSWERS

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

ASSERTION REASONING ANSWER

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

2 MARKS QUESTIONS (SOLVED)

Q1. Explain the terms Web page and Website.

Ans:- **WEBPAGE:**- It is a HTML/Web document that is opened in web browser software. It may contain multimedia information like Text, Pictures, Audio and Video etc.

WEBSITE :- It is Collection of related web pages on a web server and are linked together.

E.g   https://kvsangathan.nic.in/

Q2. Explain any two types of networks.

Ans:- 1. LAN:- Such Networks are confined to a single building, office etc. E.g Network within a School
2.   MAN:- Such Networks are spread over a whole city. E.g network of all branches of school in a Delhi , Cable TV Network

Q3. Mr. Y is confused between the terms web server and web hosting explain the basic concepts of a web server and web hosting to MR. Y

Ans:-   **WEB SERVER:**- It is the software that is installed on server computer and it sends the webpages to client computer requested through web browser. E.g Apache Tomcat, IIS

WEBSITE HOSTING:- It is the system where a WEB HOSTING provider stores and maintains all files of website and applications on a server to make it accessible to end users on internet.

Q4. Seema is unable to understand the concept of URL . Explain the term URL with example.

Ans:- **URL:-** (Uniform Resource Locator) This is the address of any resource on internet.

E.g :- https://abc.com/study/cs.pdf

Q5. Differentiate between STAR and BUS topologies
Ans:-

STAR TOPOLOGY	BUS TOPOLOGY
All the devices in the network are connected by a central hub in the star topology.	All the devices in this network are connected to a single cable- which acts as the backbone.
It requires more cables.	It requires less cables.

Q6. Write full form of the following terms related to Computer Networks:
a. WAN   (b)   VOIP   (c) WWW   (d) SMTP
Ans: WAN : Wide Area Network
VOIP:- Voice Over Internet Protocol
WWW:- World Wide Web
SMTP:- Simple mail Transfer Protocol

Q7. Explain the terms Static and dynamic Web pages.
Ans:- **STATIC WEBPAGE:-** These are web pages that remain the same until someone changes it manually

DYNAMIC WEBPAGE:- These are web pages that are changed automatically with time , place and preferences of users.

Q8. What is difference between hub and switch

HUB	SWITCH
Hub broadcasts the data signal to all devices on network	Switch unicast the data signal to the recipient only
It functions in a physical layer	It functions in the data link layer.

Q9. write any four advantages of networking.
Ans:- 1. Facilitate Communication through email, messages, video conferencing
2. Share hardware devices like a printer or scanner
3. Enable file sharing
4. Share softwares

Q10. Explain the term MODEM and GATEWAY.
Ans:- MODEM (Modulator Demodulator) :- MODEM is a device that Converts analog signal to digital (known as modulation) and digital signal to analog (known as demodulation)

GATEWAY :- This device is used to connect two dissimilar networks to resolve their protocol differences.

Q11. Define the term web browser. Give some examples of it
Ans WEB BROWSER:- It is a software/application that is used to open website on a client/User computer system. E.g Internet explorer, Google Chrome, Mozilla Firefox, opera, safari etc.

Q12. What do you understand by term WWW. Name some applications of WWW.
Ans :- WWW:- (World Wide Web) This is web of multimedia (Text, Pictures, Audio , Videos) information i.e collections of websites or webpages stored in web servers.
Applications of WWW:- Online Shopping Websites, E-Banking etc

Q13. What happens to the Network with Star topology if the following happens
      (i)   One of the computers on the network fails?
      (ii)   The central hub or switch to which all computers are connected, fails?
Ans:- i) Entire network will not fail
    ii) Entire network will get failed

Q14. Explain the terms add-ons and plug-ins.
Ans:- **ADD-ONS:**- An add-on is a program utility or physical device that can be added to a system to enhance its capabilities.

PLUG-INS:- It is a small add-on software used to enhance the functionality of a desktop program or a web application.

CASE STUDY QUESTIONS (SOLVED)

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

[CBSE Sample paper]

MUMBAI CAMPUS

DELHI HEAD OFFICE

EXAMINATION ACCOUNTS
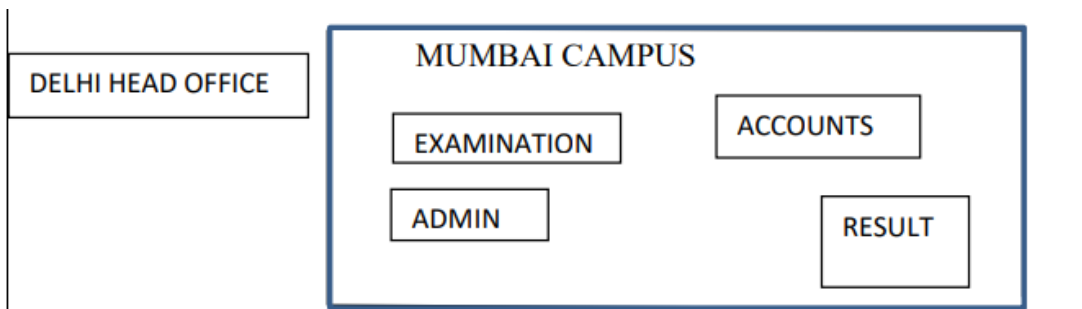
ADMIN RESULT

Shortest distances between various buildings:

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

Number of computers installed at various buildings are as follows:

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

(i) Suggest the most appropriate location of the server inside the MUMBAI campus (out of the four buildings) to get the best connectivity for maximum number of computers. Justify your answer.

(ii) Suggest and draw cable layout to efficiently connect various buildings within the MUMBAI campus for a wired connectivity.

(iii) Which networking device will you suggest to be procured by the company to interconnect all the computers of various buildings of MUMBAI campus?

(iv) Company is planning to get its website designed which will allow students to see their results after registering themselves on its server. Out of the static or dynamic, which type of website will you suggest?

(v) Which of the following will you suggest to establish the online face to face communication between the people in the ADMIN office of Mumbai campus and Delhi head office?

(a) Cable TV (b) Email (c) Video conferencing (d) Text chat

Solution:

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

ii) Star topology

(iii) Hub/Switch

66
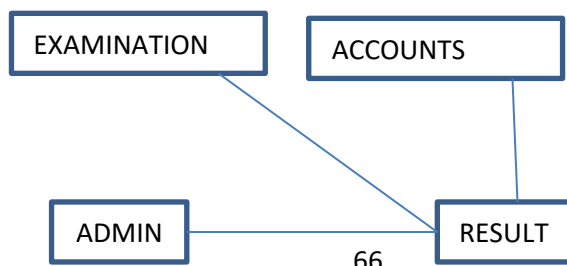
(iv) Dynamic
(v) Video conferencing

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

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

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

The company is planning to form a network by joining these blocks.
(i) Out of the four blocks on campus, suggest the location of the server that will provide the best connectivity. Explain your response.
(ii) For very fast and efficient connections between various blocks within the campus, suggest a suitable topology and draw the same.
(iii) Suggest the placement of the following devices with justification
(a) Repeater (b) Hub/Switch
(iv) VoIP technology is to be used which allows one to make voice calls using a broadband internet connection. Expand the term VoIP.
(v) The XYZ Media House intends to link its Mumbai and Delhi centers. Out of LAN, MAN, or WAN, what kind of network will be created? Justify your answer.

Solution
i) Z2 as it has maximum number of computers.
ii) For very fast and efficient connections between various blocks within the campus suitable topology: Star Topology 5
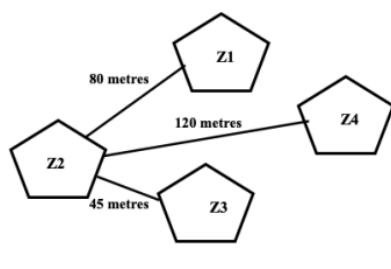

iii) Repeater: To be placed between Block Z2 to Z4 as distance between them is more than 100 meters. Hub/Switch: To be placed in each block as each block has many computers that needs to be included to form a network.

iv) Voice Over Internet Protocol
v) WAN as distance between Delhi and Mumbai is more than 40kms

CASE STUDY QUESTION (UNSOLVED)

Q1. ABC Ltd has set up its new centre at Mangalore for its office and web-based activities. It has 4 blocks of buildings as shown in the diagram below:
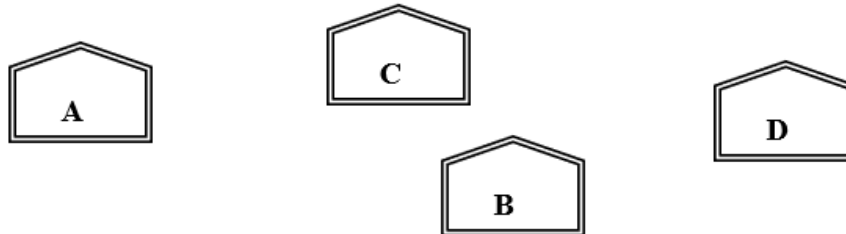
Centre to centre distances between various blocks		Number of Computers	
Black A to Block B	50 m	Black A	25
Block B to Block C	150 m	Block B	50
Block C to Block D	25 m	Block C	125
Block A to Block D	170 m	Block D	10
Block B to Block D	125 m		
Block A to Block C	90 m		

(a) Suggest a cable layout of connections between the blocks.
(b) Suggest the most suitable place (i.e. block) to house the server of this organization with a suitable reason.
(c) Suggest the placement of the following devices with justification
        (i) Repeater   (ii) Hub/Switch
(d) If ABC Ltd   make connectivity to its head office at Delhi . Then which type of Network will be formed LAN/MAN/WAN/PAN

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

Centre to centre distances between various buildings		Number of Computers	
Harsh Building to Raj Building	50 m	Harsh Building	15
Raz Building to Fazz Building	60 m	Raj Building	150
Fazz Building to Jazz Building	25 m	Fazz Building	15
Jazz Building to Harsh Building	170 m	Jazz Bulding	25
Harsh Building to Fazz Building	125 m		
Raj Building to Jazz Building	90 m		

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

(ii) Switch

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

Q3. East and West Public Ltd. has decided to network all its offices spread in five buildings.

[ ] indicates the total no. of computers.
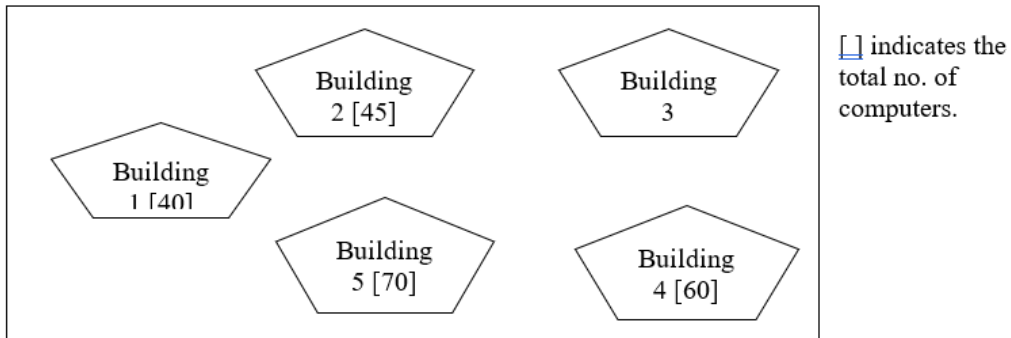
The distances between buildings are given below:

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

The distances between buildings are given below:
(i)   Suggest cable layout(s) for connecting the buildings.
(ii)   Suggest the most suitable building to install the server of this organization with a suitable reason, with justification.
(iii)   Suggest the placement of the following devices with justification?
          (a) Hub/Switch   (b) Repeater
(iv)   The company also has another office in the same city but at a distant location about 25-30 kms away. How can link be established with this building? (i.e. suggest the transmission medium).

UNIT-4
SOCIETAL IMPACTS

The last few decades have witnessed a profound revolution in computing and communications, and it is evident that technological advancements and the utilization of information technology will continue to progress at a rapid pace. This transformation is driven by not only the increased power of new information technologies but also the decreased cost of communication, resulting from technological enhancements and heightened competition. According to Moore's Law, microchip processing power doubles every 18 months. These developments offer significant opportunities while also presenting formidable challenges. Presently, innovations in information technology have wide-reaching effects on various aspects of society. Policymakers are actively addressing issues related to economic productivity, intellectual property rights, privacy protection, and the accessibility and affordability of information. Decisions made today will have long-lasting consequences, necessitating careful consideration of their social and economic impacts.

One of the most significant outcomes of this information technology progress is electronic commerce over the Internet, a novel approach to conducting business. Despite its relatively recent emergence, it has the potential to revolutionize economic activities and reshape the social landscape. Electronic commerce already influences key sectors such as communications, finance, and retail trade and has the potential to expand into domains like education and healthcare. It involves the seamless integration of information and communication technology throughout the entire electronic business value chain. In the subsequent sections, we will delve into the impacts of information technology and electronic commerce on business models, commerce, market structure, the workplace, the labor market, education, private life, and society as a whole.

DIGITAL FOOTPRINT

A digital footprint refers to the data left behind by users when they engage online. There are two types of digital footprints: passive and active. A passive footprint is created when information is collected from a user without their awareness. An active digital footprint, on the other hand, is consciously shared by users, whether through social media sites or other websites. For instance, a passive digital footprint might entail the storage of information about a user's online activities, including their origins, the timing of these activities, and their IP address. This data can be analyzed offline and accessed by administrators, offering insights into the actions performed on that machine, even if the user's identity remains concealed. In contrast, an active digital footprint involves users deliberately sharing information, such as their registered names or profiles when they comment or participate in online forums and social media platforms. These active footprints can provide substantial information about an individual, based on their online activities.

NET AND COMMUNICATION ETIQUETTES

1. Practice respect and courtesy.
2. Be conscious of how your comments may be interpreted.
3. Use humor and sarcasm cautiously.
4. Be mindful of your audience when sharing information.
5. Review friend requests and group invitations before accepting them.
6. Familiarize yourself with the rules of conduct and community standards.
7. Cultivate forgiveness and understanding in online interactions.

DATA PROTECTION

Data protection is a set of strategies and processes aimed at safeguarding the privacy, availability, and integrity of data. It is sometimes referred to as data security or information privacy. Establishing a robust data protection strategy is crucial for any organization that collects, handles, or stores sensitive data.

Data Protection vs Data Privacy:

Data protection and data privacy, while closely related, are distinct concepts. Data privacy focuses on determining who has access to data, while data protection involves implementing measures to enforce those restrictions. Data privacy establishes the policies that guide data protection tools and processes.

Data Protection Technologies and Practices:

To protect user data effectively, various storage and management options are available, including:
- **Data loss prevention (DLP):** A set of strategies and tools to prevent data theft, loss, or accidental deletion, often including recovery options.
- **Storage with built-in data protection:** Modern storage solutions offer redundancy and durability, ensuring data remains accessible and protected.
- **Firewalls:** These utilities monitor and filter network traffic, allowing authorized users access to data.
- **Authentication and authorization:** Controls that verify credentials and apply user privileges correctly, often part of identity and access management (IAM) and role-based access controls (RBAC).
- **Encryption:** Utilizes algorithms to protect data by making it unreadable without the correct encryption key, ensuring data remains secure.
- **Endpoint protection:** Guards network gateways, including ports, routers, and connected devices, allowing for monitoring and traffic filtering.
- **Data erasure:** Deletes unnecessary data, reducing liability and complying with regulations such as GDPR.

These practices and technologies are essential to maintaining the privacy and security of sensitive data.

INTELLECTUAL PROPERTY RIGHTS (IPR)

Property:

The term "property" typically refers to a possession or, more precisely, something to which the owner holds legal rights.

Intellectual Property:

Intellectual Property encompasses creations of the human intellect that are utilized in commerce. These creations include:
- Inventions
- Literary and Artistic works
- Symbols
- Names, Images, and Designs

Intellectual property comprises innovative inventions created by individuals or groups, utilizing their intellectual capacity for eventual use in commerce, and that is not already publicly available.

Examples of intellectual property include inventions related to products or processes, new designs, literary or artistic works, and trademarks (such as words, symbols, or logos).

Intellectual Property (IP) is a term that encompasses various types of creations, including brands, inventions, designs, or other forms of intellectual work for which individuals or businesses possess legal rights. Virtually all businesses own some form of IP, which often represents a valuable business asset. Common types of IP include:

- **Copyright**: Protects written or published works like books, songs, films, web content, and artistic works.
- **Patents**: Safeguard commercial inventions, such as new products or processes.
- **Designs**: Protect various designs, including drawings and computer models.
- **Trademarks**: Safeguard signs, symbols, logos, words, or sounds that distinguish a business's products and services from those of competitors. IP can be either registered or unregistered.

Intellectual Property Rights (IPR) refers to the legal ownership rights associated with intangible assets owned by individuals or companies, protecting them from unauthorized use without consent or proper licensing. This category includes proprietary software, shareware, nagware, and branded computer hardware. These rights cover various forms of intellectual work, such as registered domain names, industrial designs, confidential information, inventions, program and database rights, and literary works in physical or digital forms.
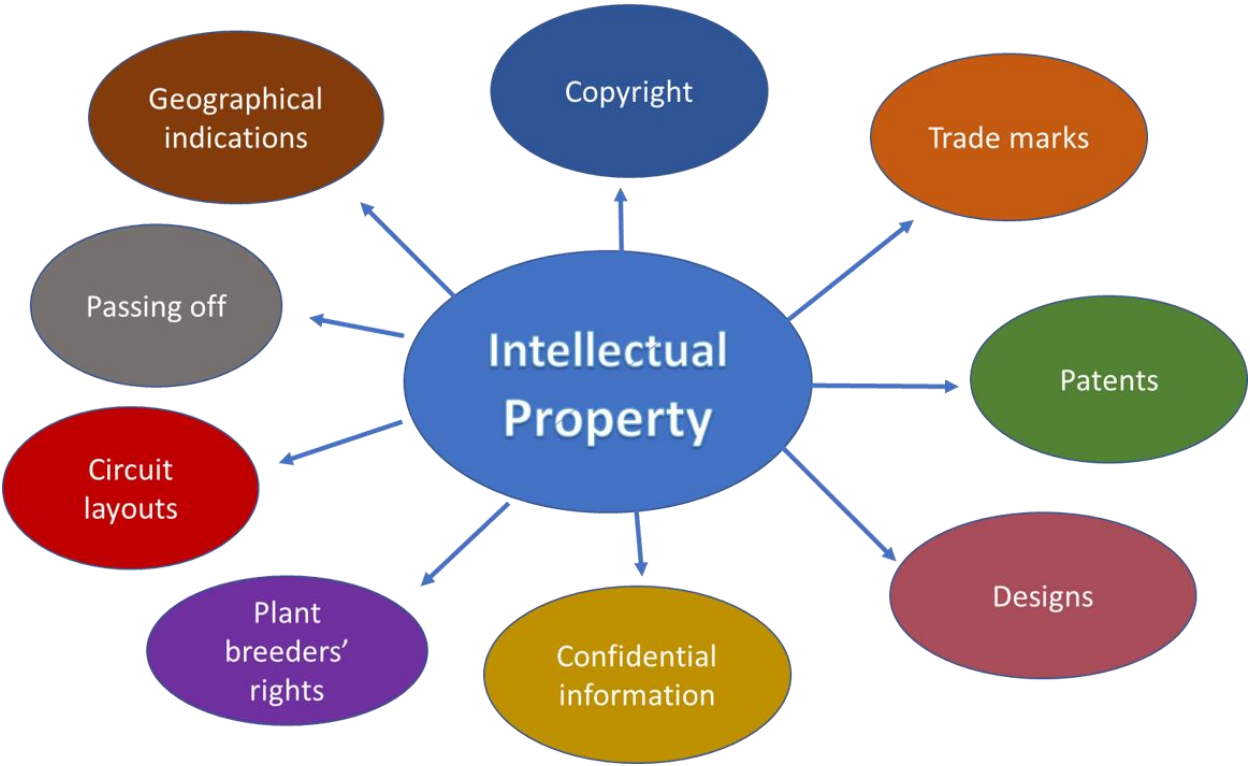
Copyright Laws:
Copyright is a legal concept established by most governments, granting the creators of original work exclusive rights to that work, typically for a limited period.

Plagiarism:
Plagiarism involves stealing someone's intellectual work and presenting it as one's own without providing proper citation or acknowledgment. It can take various forms, such as copying others' work, presenting it as one's own, and involves dishonesty and deception.

To prevent plagiarism, one should:
- Use their own words and ideas.
- Always provide proper references and credit the sources of information.
- Give credit when using another person's ideas, opinions, written or spoken words, or paraphrased content.

Licensing:
Software licensing refers to the legal right or privilege granted by a company for the use of their software or application. For example, when purchasing proprietary software like Windows OS, users must agree to a license agreement before installation.

Licensed software offers the following advantages:
1. Supports the further development of the program.
2. Provides customer support and assistance not available in pirated software.

Free and Open-Source Software (FOSS):
FOSS is software that can be classified as both free and open-source. Users are allowed to use, modify, study, and distribute the software freely, with open access to the source code.

Free Software:
Free software, according to the Free Software Foundation, upholds four essential freedoms:
- The freedom to run the program for any purpose.
- The freedom to study and change the program.
- The freedom to redistribute copies.
- The freedom to distribute modified versions.

Open-Source Software:
Open-source software is released under a license that grants users the rights to use, study, change, and distribute the software and its source code for any purpose. It is often developed collaboratively in a public manner.

CYBERCRIME

Cybercrime, also known as computer-oriented crime, encompasses criminal activities involving computers and networks. Computers may be either the tool used to commit a crime or the target of the crime. It involves the use of computers for illicit activities such as fraud, identity theft, and privacy breaches. In today's world, where computers are central to various sectors like commerce, entertainment, and government, cybercrime has gained significant prominence. It poses threats to both individuals and national security, as well as financial well-being.

Cybercriminal activities occur in a digital environment and can be categorized into two groups. In one category, cybercrimes target computer networks or devices, involving threats like viruses and denial-of-service attacks. The other category involves using computer networks to commit other criminal activities, including cyberstalking, financial fraud, or identity theft.

Classification of Cybercrime:
1. **Cyber Terrorism:** This involves using computers and the internet to perform violent acts that threaten human life. Cyberterrorism encompasses various activities aimed at instilling fear through the use of cyberspace and computer resources.
2. **Cyber Extortion:** Cyber extortion occurs when hackers subject websites, email servers, or computer systems to repeated denial-of-service attacks, demanding substantial sums of money in exchange for halting these attacks and providing protection.
3. **Cyber Warfare:** Cyber warfare refers to the use of computers, online control systems, and networks in a battle space or warfare context. It includes both offensive and defensive operations, the threat of cyberattacks, espionage, and sabotage.
4. **Internet Fraud:** Internet fraud involves using deceit or fraudulent activities over the internet to deceive victims, often with the aim of acquiring money or property. It encompasses a range of illicit actions committed in the digital realm.
5. **Cyber Stalking:** Cyberstalking is a form of online harassment where victims are inundated with a barrage of online messages and emails. Stalkers may use the internet to harass and intimidate individuals, often combining online and offline stalking to maximize the victim's distress.

Prevention of Cybercrime:
To prevent cybercrime, several measures should be taken:
1. **Use Strong Passwords:** Create and maintain strong and unique password combinations for each account to prevent unauthorized access.
2. **Use Trusted Antivirus Software:** Employ reputable and advanced antivirus software to protect your devices from various virus attacks.
3. **Maintain Social Media Privacy:** Limit access to your social media accounts to known individuals and friends, and do not share sensitive information publicly.
4. **Keep Software Updated:** Regularly update your device's software to address security vulnerabilities and maintain its security.

Hacking:
Hacking involves unauthorized access to computer systems, networks, or digital systems. Hackers typically possess technical expertise in both hardware and software. Hacking can be used for positive purposes, such as ethical hacking, in which white hat hackers explore vulnerabilities to enhance a system's security. Ethical hackers report their findings to the system owner to help protect against cyberattacks.

Phishing and Fraudulent Emails:
Phishing is an illicit activity where fake websites or emails that appear authentic are used to deceive users into providing personal and sensitive information. Hackers often use email spoofing to create a false sense of legitimacy.

Cyber Bullying:
Cyberbullying includes various forms of online harassment, involving insults, threats, and the public sharing of personal information with the intent to ridicule or harm the victim. Cyberbullying can have serious consequences for the victim.

Identity Theft:
Identity theft occurs when personal data, such as demographic details, email IDs, banking credentials, and more, are stolen and misused for monetary gain or other illicit activities.

Indian Information Technology Act (IT Act):
The Information Technology Act, 2000 (IT Act) in India, amended in 2008, provides guidelines for the protection of sensitive personal data and the rights of internet users. It establishes a legal framework for electronic governance, recognizing electronic records and digital signatures. The act outlines cybercrimes and their penalties and sets up the Cyber Appellate Tribunal to address disputes arising from such crimes.

Cybercrime cells in police stations across many Indian states allow individuals to report cybercrimes. The IT Act is essential to enable secure online transactions and protect individuals from the misuse of their information.

Key Points on the Indian Information Technology Act (IT Act):
1. **Enactment and Amendment:** The Indian Information Technology Act (IT Act) was enacted in the year 2000 and subsequently amended in 2008 to address the evolving landscape of information technology and cybercrimes.
2. **Protection of Personal Data:** The IT Act provides guidelines and legal mechanisms for the protection of sensitive personal data, particularly in the context of electronic transactions and digital communication.
3. **Rights of Internet Users:** It recognizes and upholds the rights of internet users, ensuring that individuals have legal safeguards while operating in the digital realm.
4. **Legal Framework for Electronic Governance:** The IT Act establishes a legal framework for electronic governance, enabling the recognition of electronic records and digital signatures as legally valid and enforceable.
5. **Cybercrime Provisions:** The act includes provisions that outline various cybercrimes and prescribes penalties for those who engage in illegal activities in the digital domain.
6. **Cyber Appellate Tribunal:** To resolve disputes arising from cybercrimes and related matters, the IT Act sets up the Cyber Appellate Tribunal, which plays a vital role in adjudicating disputes in the cyber world.
7. **Reporting Cybercrimes:** Many Indian states have established cybercrime cells within their police stations. These cells serve as dedicated units for individuals to report cybercrimes, ensuring that law enforcement is equipped to handle digital offenses effectively.

8. **Secure Online Transactions:** The IT Act plays a crucial role in facilitating secure online transactions, ensuring that individuals can engage in electronic commerce with confidence in the legal framework that governs it.
9. **Protection from Information Misuse:** The act is designed to protect individuals from the misuse of their personal and sensitive information in the digital space, offering legal recourse and protection against unauthorized use.
10. **Adaptation to Changing Technology:** The IT Act recognizes the dynamic nature of technology and seeks to adapt and respond to the evolving landscape of information technology and cyber threats, ensuring that legal provisions remain relevant and effective.

In summary, the Indian Information Technology Act (IT Act) is a comprehensive legal framework designed to protect individuals' rights and data in the digital realm, address cybercrimes, and provide a legal framework for electronic governance in India. It plays a crucial role in ensuring the secure and responsible use of information technology and electronic communication.

E-Waste: Hazards and Management

E-waste encompasses a wide range of electronic and electrical appliances, including items like computers, mobile phones, digital music players, refrigerators, washing machines, and televisions (TVs), among various other household consumer products.

Hazards of E-Waste:
- Most electronic waste contains hazardous substances such as lead, beryllium, and mercury.
- Improper disposal of electronic gadgets increases the release of these toxic chemicals, contaminating the soil and causing air and water pollution.
- The polluted water becomes unfit for drinking due to high levels of contamination.
- Inadequate e-waste recycling methods, such as open burning and acid baths, result in the creation of hazardous and toxic compounds like dioxins, furans, and acids.
- Health implications of improper e-waste disposal include damage to the immune system, skin diseases, multiple ailments, and various skin problems.

E-Waste Management:
Proper e-waste management involves the recycling and recovery of discarded materials, and it includes the following steps:
1. **Dismantling:** This step involves the removal of components containing valuable materials like copper, silver, gold, steel, and the safe removal of parts containing dangerous substances such as mercury, lead, and beryllium.
2. **Metal and Plastic Separation:** Materials are sorted to separate metals from plastics.
3. **Refurbishment and Reuse:** Electronics that can be refurbished are prepared for reuse.
4. **Recovery of Valuable Materials:** Valuable materials are extracted from the e-waste.
5. **Disposal of Hazardous Materials:** Dangerous substances like mercury, lead, and beryllium are properly disposed of in underground landfill sites.

Awareness of Health Concerns Related to Technology Use:
As computer technologies become increasingly integrated into our lives, they offer numerous benefits, from educational opportunities and online shopping to global communication and remote work capabilities. However, if these technologies are not used with care, they can lead to various health issues, including:
1. Neck strain

2. Vision problems
3. Feelings of isolation
4. Sleep disorders
5. Increased stress
6. Decreased attention spans
7. Strained social relationships
8. Computer-related anxiety
9. Internet addiction

To prevent these problems, individuals should learn how to use technology in a way that does not adversely affect their health. Some users may not even be aware of the health-related issues they are experiencing due to technology use.

Case-Based Multiple Choice Questions (MCQs) on Societal Impacts

Q1. Aniruddha is studying the concepts of digital footprints. Help him to clarify the concepts of digital footprints.

(i) Digital footprints are also known as _____
a. Digital data
b. Plagiarism
c. Digital tattoos
d. Digital print

(ii) Digital footprints are stored _____
a. Temporarily (for few days)
b. Permanently
c. for 7 days only
d. for 3 days

(iii) Whenever we surf the Internet using smartphones we leave a trail of data reflecting the activities performed by us online, which is our _____
a. Digital footprint
b. Digital activities
c. Online handprint
d. Internet activities

(iv) There are _____ kinds of Digital footprints.
a. 1
b. 2
c. 3
d. 4

(v) Which is the correct type(s) of digital footprint?
a. Active digital footprint
b. Passive digital footprint
c. Both a and b
d. None

Q2. Shobhit is eager to know the best way to behave on the internet. Help him to know the concepts of net and communication etiquettes.

(i) Digital communication includes _____
a. Email
b. Texting
c. Instant messaging
d. All of the above

(ii) _____ is a person who deliberately sows discord on the Internet by starting quarrels or upsetting people, by posting inflammatory or off-topic messages in an online community.
a. Netizen
b. Digital Citizen
c. Internet troll
d. None of the above

(iii) Online posting of rumors, giving threats online, posting the victim's personal information, comments aimed to publicly ridicule a victim is termed as _____
a. Cyber bullying
b. Cyber insult
c. Cybercrime
d. All of the above

(iv) Being a responsible digital citizen, we should _____
a. not use copyrighted materials
b. avoids cyber bullying
c. respect the privacy of others
d. All of the above

(v) Which of the following is Net Etiquette?
a. Be Ethical
b. Be Respectful
c. Be Responsible
d. All of the above

Q3. Namita has recently shifted to a new city and a new school. She does not know many people in her new city and school. But among all the students, someone is posting negative, demeaning comments on her social networking profile, school site's forum, etc. She is also getting repeated emails from unknown people. Every time she goes online, she finds someone chasing her online.
a) What is happening to Namita?
i. Namita has become a victim of cyberbullying and cyberstalking.
ii. Eavesdropping
iii. Scam
iv. Violation of IPR

b) What action should be taken by her to stop them?
i. Discuss with Parents
ii. Discuss in peer group
iii. Hide and get herself emotionally hurt
iv. She must immediately bring it to the notice of her parents and school authorities. And she must report this cybercrime to local police with the help of her parents.

c) The act of fraudulently acquiring someone's personal and private information, such as online account names, login information, and passwords is called as _____.
i. Phishing
ii. Fraud
iii. Identity Theft
iv. Plagiarism

d) Namita needs to protect her personal information or data from unintentional and intentional attacks and disclosure which is termed as _____.
i. Digital right
ii. Copyright
iii. Privacy
iv. Intellectual property

e) A set of moral principles that governs the behavior of a group or individual and regulates the use of computers.
i. Copyright
ii. Computer ethics
iii. Property rights
iv. Privacy law

Answers:

Q1.	Answer
(i)	c. Digital tattoos
(ii)	b. Permanently
(iii)	a. Digital footprint
(iv)	c. 3
(v)	c. Both a and b
Q2.	Answer
(i)	d. All of the above
(ii)	c. Internet troll
(iii)	a. Cyber bullying
(iv)	d. All of the above
(v)	d. All of the above
Q3.	Answer
(i)	i. Namita has become a victim of cyberbullying and cyberstalking.
(ii)	iv. She must immediately bring it to the notice of her parents and school authorities. And she must report this cybercrime to local police with the help of her parents.
(iii)	iii. Identity Theft
(iv)	iii. Privacy
(v)	ii. Computer ethics

Very Short Answer Type Questions (1 mark)
1. In which year did the Indian IT Act, 2000 get updated?
2. What is data privacy?

3. Which of the following is not a type of cybercrime?
   a) Data theft
   b) Forgery
   c) Damage to data and systems
   d) Installing antivirus for protection

Answers:
1. Answer: 2008
2. Answer: Data privacy refers to the protection of personal and sensitive information from unauthorized access, use, or disclosure.
3. Answer: d) Installing antivirus for protection

Short Answer Type Questions (2 marks)
1. What is identity theft? How can we prevent identity theft?
2. Define e-waste. What are the various methods for effective e-waste management?
3. What do you mean by plagiarism? Provide 2 examples of acts that can be termed as plagiarism.
4. Define digital property rights and explain.
5. State 2 measures for the protection of digital property rights.
6. Differentiate between shareware and proprietary software.
7. Explain what cybercrime is and provide an explanation of "information theft."
8. Provide 2 benefits of ICT on today's society.
9. State 2 benefits of e-waste recycling.
10. Differentiate between Free Software and Open-Source Software.

Answers:
1. Identity theft is a crime in which someone wrongfully acquires and uses another person's personal information, such as their name, social security number, or financial data, typically for fraudulent purposes.
   To prevent identity theft, individuals should:
   - Safeguard personal information.
   - Use strong and unique passwords.
   - Be cautious with sharing personal information online.
   - Monitor financial statements and credit reports.

2. E-waste (electronic waste) refers to discarded electronic and electrical equipment. Effective e-waste management involves:
   - Collection of e-waste from consumers.
   - Recycling to recover valuable materials.
   - Safe disposal of hazardous components.
   - Promoting reuse and refurbishment of electronics.

3. Plagiarism is the act of using someone else's work, ideas, or intellectual property without proper attribution. Two examples of acts that can be considered plagiarism:
   1. Copying and submitting a research paper without citing the original source.
   2. Using images from the internet in a presentation without providing image credits.

4. Digital property rights refer to the legal rights and protections granted to individuals or entities over their digital assets, including software, digital content, and intellectual

property. These rights ensure that creators have control over their work and can prevent unauthorized use or distribution.

5. State 2 measures for the protection of digital property rights.
   - Register intellectual property with relevant authorities.
   - Use digital rights management (DRM) tools to protect digital content from unauthorized copying or distribution.

6. Shareware is software that is distributed for free, often with limited features, and requires payment for full functionality. Proprietary software is commercially licensed software that does not provide access to the source code and has restrictions on distribution and modification.
7. Cybercrime refers to criminal activities carried out in the digital domain. Information theft involves stealing sensitive data, such as personal information, financial records, or intellectual property, through unauthorized access to computer systems or networks.
8. (i) Improved communication and connectivity.
   (ii) Enhanced access to information and educational resources.
9. (i) Reduction of environmental pollution from hazardous materials.
   (ii) Recovery of valuable resources, such as metals, from electronic waste.
10. Free Software is software that allows users to use, modify, and distribute the software freely, often with the requirement that any modified versions remain open and free. Open-Source Software provides access to the source code of the software, allowing users to view, modify, and distribute it, typically with the requirement that modifications are shared with the community.

Long Answer Type Questions (3/4 marks)
1. Sumit received a laptop as a gift after achieving good marks in all subjects. His father wants to make him aware of the health hazards associated with inappropriate and excessive laptop usage. Help Sumit's father by listing the points he should discuss with Sumit.
2. Explain what cybercrime is, its types, and measures to avoid it.
3. Discuss the social and cultural changes induced by technology.
4. Define internet addiction and suggest methods to overcome it.
5. Provide 2 benefits of ICT on today's society.
6. With one major Asian country generating approximately 2 million tonnes of electronic waste annually and only 1.5% of the total e-waste being recycled, suggest a method to manage e-waste.
7. Explain Net Etiquettes and provide information on two such etiquettes.
8. Priyanka uses her internet connection to book a flight ticket, leaving a trail of web activities. What is this type of activity called? What are the associated risks?

Answers:
1.
   - Discuss the importance of maintaining proper posture while using the laptop to avoid physical strain.
   - Explain the risks of excessive screen time, such as eye strain, headaches, and disrupted sleep patterns.
   - Emphasize the need for regular breaks to stretch and rest the eyes.

- Talk about the potential negative impact on social interactions and outdoor activities due to excessive laptop use.
- Stress the importance of cybersecurity and responsible online behavior.

2.

Cybercrime refers to criminal activities conducted in the digital realm. Types of cybercrime include hacking, phishing, identity theft, cyberbullying, and more. To avoid cybercrime, individuals should:
- Use strong and unique passwords.
- Be cautious about sharing personal information online.
- Keep software and antivirus programs up-to-date.
- Avoid suspicious websites and emails.
- Report any cybercrimes to law enforcement.

3.

- Technology has led to increased connectivity, changing the way people interact and communicate.
- It has influenced the way information is accessed, leading to a more informed society.
- Cultural changes include shifts in traditions, art forms, and entertainment due to digital media.
- It has also raised concerns about privacy and surveillance in society.

4.

Internet addiction is a compulsive dependency on the internet that interferes with daily life. Methods to overcome it include:
- Setting time limits for online activities.
- Engaging in offline hobbies and social interactions.
- Seeking professional help if addiction is severe.

5.

- ICT (Information and Communication Technology) has improved communication and connectivity, allowing people to stay connected globally.
- It has enhanced access to education, information, and services, bridging the digital divide.

6.

- Implement comprehensive e-waste recycling programs, with incentives for individuals and businesses to recycle their electronic devices responsibly.
- Develop collection centers and partnerships with recycling facilities to ensure the proper disposal and recycling of electronic waste.

7.

Net Etiquettes (Internet Etiquettes) are guidelines for polite and respectful online behavior. Two such etiquettes are:
- Always use proper language and avoid offensive or hurtful comments in online discussions.
- Respect other people's privacy by not sharing their personal information without consent.

8.

This type of activity is called "digital footprint" or "online footprint." The associated risks include potential data privacy issues and the collection of personal information by websites or third parties, which can lead to targeted advertising and potential data breaches.

1. Understand the Syllabus: Familiarize yourself with the entire syllabus to know what to expect in the exam.
2. Organize Your Study Material: Create a well-organized study plan with all relevant study materials.
3. Time Management: Allocate specific time slots for each subject or topic. Stick to your schedule to cover all areas.
4. Practice Regularly: Consistent practice helps improve your understanding and retention of the material.
5. Previous Year Papers: Solve previous year question papers to get an idea of the exam pattern.
6. Mock Tests: Take mock tests to simulate the exam environment and assess your progress.
7. Healthy Lifestyle: Maintain a healthy lifestyle with proper sleep, nutrition, and exercise to stay mentally alert.
8. Effective Notes: Make concise notes while studying to facilitate quick revision.
9. Understanding Over Memorization: Focus on understanding concepts rather than rote memorization.
10. Clarify Doubts: Seek help from teachers, peers, or online resources to clarify doubts.
11. Self-Assessment: Regularly evaluate your progress and adjust your study plan accordingly.
12. Study Groups: Join or form study groups for group discussions and sharing knowledge.
13. Manage Stress: Learn relaxation techniques to manage exam-related stress.
14. Positive Mindset: Stay positive and confident about your preparation.
15. Exam Instructions: Carefully read and understand the exam instructions and question patterns.
16. Time Allocation: Distribute your time wisely among different sections of the exam.
17. Answer All Questions: Attempt all questions even if you're unsure; you might get partial credit.
18. Key Points First: When writing essays or long answers, begin with key points to grab the examiner's attention.
19. Revisions: Allocate time for multiple revisions before the exam.
20. Stay Calm: During the exam, stay calm, read questions carefully, and answer confidently.

Remember, success in exams is not just about how much you know but also how well you prepare and manage your time effectively. Good luck with your exams!