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TERM-I EXAM

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CBSE MCQs QUESTION BANK CHAPTERWISE CLASS 12

INFORMATICS PRACTICES

Strictly as per the Latest Term-wise Syllabus released on 22 July 2021 (CBSE Cir. No. Acad-53/2021)

ACADEMICS' CHOICE SMART BOOK AWARD WINNER

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Revision Notes

Mind Maps

- Stand Alone MCQs
- Assertion & Reason based MCQs
- Case based MCQs

Strictly updated as per the CBSE Special Scheme of Assessment (SAS) released on 5th July 2021

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THE ECONOMIC TIMES ICONIC BRANDS OF INDIA Made in India



- Revision Notes
- Mind Maps & Mnemonics
- •MCQs
  •Assertion & Reason
  •Case based MCQs

Strictly updated as per the CBSE Special Scheme of Assessment (SAS) released on 5th July 2021

1st EDITION

YEAR 2021-22

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SYLLABUS COVERED

CENTRAL BOARD OF SECONDARY EDUCATION DELHI

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❑❑



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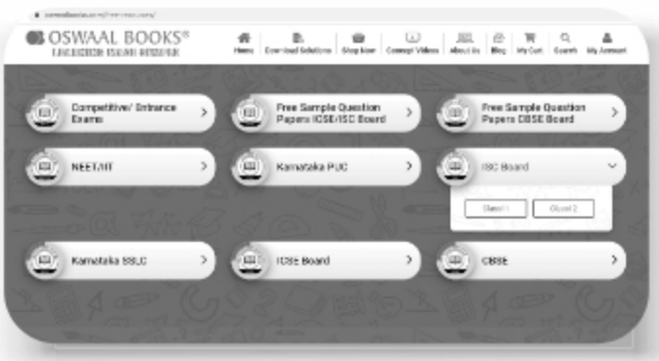

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TWIST IN THE TEST



The Special Assessment Scheme

CBSE's Special Assessment Scheme has radically transformed the evaluation landscape.

This novel decision has unequivocally changed the perception of board examinations in India. This change has made our examination systems compatible with semester-based systems followed in higher education institutions in the country and across the globe.

As per the Special Assessment Scheme, the Academic Session 2021-22 will be divided into two terms with approximately 50% syllabus in each term, thereby helping the students in achieving the learning objectives over a more structured and progressively flexible curriculum.

How will this special scheme benefit the students?

2020 was a year that has fundamentally changed the world as we knew it. Every sector underwent a transformation, none more so than education. Students and teachers alike adapted to online learning, examinations and new teaching learning methodologies.

This announcement, right at the start of the new academic year, gives teachers and students ample time to prepare and plan for the year. This timely announcement will enable students to have a clear understanding of what they need to study for their Terms – I & II for their board examinations.

How to prepare for Term – I board?

There is a lot of focus on MCQs in the assessment policy as they are a robust assessment technique for evaluating learning outcomes.

MCQs are an excellent way to test conceptual understanding. They offer the advantages of versatility (can be used to assess application & problem solving), and are a much more reliable test of understanding.

The Term – I examination will be of 90 minutes' duration and the question paper will have Multiple Choice Questions (MCQs) including case-based MCQs and MCQs on assertion-reason type. This focus on MCQs will make students mentally more ready for facing competitive examinations in the future.

Oswaal CBSE Chapter-wise Question Banks for Term – I are strictly based on the new term-wise syllabus for Board examinations to be held in the Academic Session 2021-22.

For extensive practice of MCQs based questions and for deep understanding of core-concepts.

These Question Banks include:

1. Multiple Choice Questions based on latest typologies introduced by the board like:
   a. Stand-alone MCQs
   b. MCQs based on Assertion-Reason
   c. Case-based MCQs
2. Revision Notes, Mnemonics, Mind Maps, Answers with Explanations & Concept videos, all of which enhance learning experiences and improve learning outcomes.
3. Questions from CBSE official Question Bank (released in April 2021) for exam-oriented preparation.

Our Heartfelt Gratitude

Finally, we would like to thank our authors, editors, and reviewers. We promise to always strive towards **'Making Learning Simple'** for all of you.

Wish you all Happy Learning!

Wish you all Happy Learning and a Successful 2021-22!!

30 DAYS OF ONLY GRATITUDE!

Take it as a challenge; practice gratitude every day.

When you'll look around yourself, you'll find umpteen number of things to be grateful for. Practicing gratitude everyday will only multiply those things in your life & will ignite positive emotions in you. Here are a few things you could be grateful for. So, get started today!



#1 About your body.



#2 What you find beautiful.



#3 A song you love.



#4 An accomplish-ment of yours.



#5 A friend.

#6 A Smell you love.



#7 Something that makes you smile.



#8 A happy memory.



#9 Something you like about where you live.



#10 A person in your family.



#11 A food you love.



#12 An ability of yours.

#13 A person.



#14 You're looking forward to.



#15 A life lesson.



#16 A person you look up to.



#17 A personality trait of yours.



#18 An item you use every day.



#19 A freedom you are grateful for.



#20 A holiday you love.



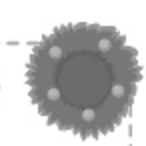
#21 A technology.



#22 Something made you laugh.



#23 Something nice.



#24 A book magazine or podcast.



#25 Another person.



#26 Something in nature.



#27 A gift you received.



#28 Something that brings hope.



#29 A compliment you have received.



#30 Something you are passionate about.

HEAR IT FROM OUR HAPPY READERS!

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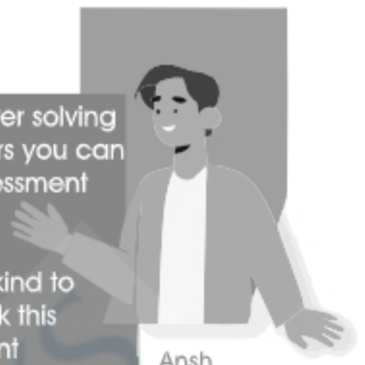
Good sample paper for preparation after revision. Once I finished my syllabus for boards, I used sample papers for practicing and found it really good and beneficial.

Daksh Gaba
Teacher



If you are confident after solving 5 solved sample papers you can practice the 5 self-assessment papers which have QR code so you can see answers and they are kind to provide hints and I think this worked for me. Excellent preparation tool for my Boards!!

Ansh
Teacher



Very good test papers as per new CBSE pattern. Very good mind maps and chapter wise notes. Also, toppers answer papers for reference are extremely helpful.

Rajni
Student



Rohan Mehra
Teacher

This is the best book of sample papers for 10th. Best material for the board preparation. Highly Recommended!!



Oswaal Sample Question Papers are great for practice because it contains a variety of questions synchronised with the latest syllabus. Kudos to the Oswaal Editorial Team!

Shalini Mehta
Student



This is the best till date, I completed all the sample papers and got a good practice of writing in examination, just go for it. Surely, it will help you a lot.

Prem
Student



Awesome book for preparations in board exam. 65-70% questions cracked in the board exam 2020 from this book.

Abhay Kumar
Student



I recommend Oswaal Sample Question Papers to all the students studying in the 10th grade. This book is awesome and very helpful.

Soham Roshan
Student



Awesome book! Class 10th students must buy it as soon as possible! Very helpful!

Neel
Student

केन्द्रीय माध्यमिक शिक्षा बोर्ड
CENTRAL BOARD OF SECONDARY EDUCATION

NO.: F.1001/CBSE-Acad/Curriculum/2021 **Date: July 22, 2021**

Circular No: Acad- 53/2021

All the Heads of Schools affiliated to CBSE

Subject: Term wise syllabus for Board Examinations to be held in the academic session 2021-22 for Secondary and Senior Secondary classes and guidelines for the conduct of the Internal Assessment/Practicum/Project.

This is in continuation to Board's circular number Acad 51/2021 dated July 05, 2021 regarding Special Scheme of Assessment for Board Examination for Classes X and XII for the Session 2021- 22. The syllabus for the two terms mentioned in the scheme in all subjects for classes IX to XII are hereby notified vides this circular. In addition to syllabus for term end board examinations, guidelines for the conduct of Internal Assessment/Practicum/Project are also enclosed.

Schools are requested to share the term wise syllabus and guidelines for the conduct of board examinations and Internal Assessment / Practicum / Project available on CBSE Academic Website **http://www.cbseacademic.nic.in** at the link **http://cbseacademic.nic.in/Term-wise-curriculum_2022.html** with all their teachers and students.

(Dr. Joseph Emmanuel)
Director (Academics)

SYLLABUS

INFORMATICS PRACTICES

(Code No.- 065) CLASS-XII

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.
- Learn terminology related to networking and the 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

Units 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
	Practicals	30	–	–	–
	TOTAL	100	71	49	120

Term - 1

Distribution of Theory Marks

Units No.	Unit Name	Marks
1.	Data Handling using Pandas and Data Visualization	25
4.	Societal Impacts	10
	Total	35

SYLLABUS

Unit 1 : Data Handling using Pandas and Data Visualization

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; series attributes, head and tail functions; selection, indexing and slicing.
- Data Frames: creation of data frames from dictionary of series, list of dictionaries, text/CSV files, display, iteration. Operations on rows and columns: add (insert /append) , select, delete (drop column and row), rename, Head and Tail functions, indexing using labels, Boolean indexing.

Data Visualization:

- Data Visualization : Purpose of plotting, drawing and saving of plots using Matplotlib (line plot, bar graph, histogram). Customizing plots:; adding label, title, and legend in plots.

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.

Distribution of Practical Marks

Topic	Marks
Pandas program (pen and paper or Collab or any online idle or pyroid screen for mobile)	8
Practical File 15 Pandas Programs	3
Project synopsis	2
Viva	2
Total	15

Suggested Practical List

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.

Project Synopsis

The synopsis should cover the brief description about the project along with reasons for selection of the dataset. The learner should write the source of the dataset whether created or taken from any reliable source. The learner should write what analytics can be done on the project.

Term - 2

Distribution of Theory Marks

Units No.	Unit Name	Marks
2.	Database Query using SQL	25
3.	Introduction to Computer Networks	10
	Total	35

Unit 2 : Database Query using SQL

- 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.

SYLLABUS

Unit 3 : Introduction to Computer Networks

- Introduction to networks, Types of network: 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.

Distribution of Practical Marks

Topic	Marks
SQL queries (pen and paper)	7
Practical File – 12 SQL Queries	2
Final Project Submission	3
Viva	3
Total	15

Suggested Practical List

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.

Project Work

The aim of the class project is to create tangible and useful IT applications. 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.

SYLLABUS

The learner can take data stored in csv or database file and analyze using Python libraries and generate appropriate charts to visualize. If an organization is maintaining data offline, then the learner should create a database using MySQL and store the data in tables.

Data can be imported in Pandas for analysis and visualization. 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.

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POSITIVE AFFIRMATIONS



"Affirmations are like a seed planted in soil. Poor soil, poor growth. Rich soil, abundant growth. The more you choose to think thoughts that make you feel good, the quicker the affirmations work."

- Louise Hay





- I am confident.
- I love who I am.
- I am compassionate.
- I am responsible.
- I am a leader.
- I believe in my dreams.
- I am brave.
- I choose a positive attitude.
- I am enough.
- I am great just the way I am.
- I work hard.
- I radiate joy and love.
- I am honest.
- I ampatient.
- I help my family.
- I am strong.
- I can achieve my goals.
- I make good decisions.
- I am diligent.
- I am thoughtful.
- I am talented.
- I am loved.
- I am generous.
- I accept and love myself.
- I am unique.
- I am wonderfully made.
- I am creative.
- Good things happen to me.
- I am loving.
- I am kind.
- I am joyful.
- I care about others.
- I am important.
- I like myself.
- It's going to be a great day.
- I learn from my mistakes.
- I make friends easily.
- I am worthy.
- I am open to new experiences.
- I am beautiful.
- I am deserving of good things.
- I am grateful.
- I believe in me.
- I respect myself and I respect others.

Our mind starts believing what we repeatedly think or say. We, at Oswaal Books, resonate with this belief. So, we want all our readers to create their own positive affirmations! A positive affirmation is something spoken aloud that you want to believe or want to be true. Repeating positive affirmations daily can help shift your internal dialogue from negative to positive.

So let's get started!

MIND MAPS
Learning Made Simple





anytime, as frequency as you like till it becomes a habit!



When?

What?

Presenting words and concepts as pictures!!

MIND MAP
AN INTERACTIVE MAGICAL TOOL

Why?

- To Unlock the imagination and come up with ideas
- To Remember facts and figures easily
- To Make clearer and better notes
- To Concentrate and save time
- To Plan with ease and ace exams

Result



Learning made simple
'a winning combination'

How?



With a blank sheet of paper coloured pens and your creative imagination!

What are Associations?

It's a technique connecting the core concept at the Centre to related concepts or ideas. Associations spreading out straight from the core concept are the First Level of Association. Then we have a Second Level of Association emitting from the first level and the chronology continues. The thickest line is the First Level of Association and the lines keep getting thinner as we move to the subsequent levels of association. This is exactly how the brain functions, therefore these Mind Maps. Associations are one powerful memory aid connecting seemingly unrelated concepts, hence strengthening memory.

WRITING NOTES

1. .....
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CHAPTER 1

DATA HANDLING USING PANDAS-I

Syllabus

- *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; series attributes, head and tail functions; selection, indexing and slicing.*
- *Data Frames: creation of data frames from dictionary of series, list of dictionaries, text/CSV files, display, iteration. Operations on rows and columns: add add (insert /append) , select, delete (drop column and row), rename, Head and Tail functions, indexing using labels, Boolean indexing.*

Revision Notes

Introduction To Python Libraries

- **Pandas**

The Pandas is a high-performance open source library for data analysis in Python, developed by Wes McKinney in 2008. Over the years, it has become the de-facto standard library for data analysis using Python.

There are 3 well-established python libraries namely NumPy, Pandas and Matplotlib specially for scientific and analytical use.

These libraries allow us to manipulate, transform and visualise data easily and efficiently.

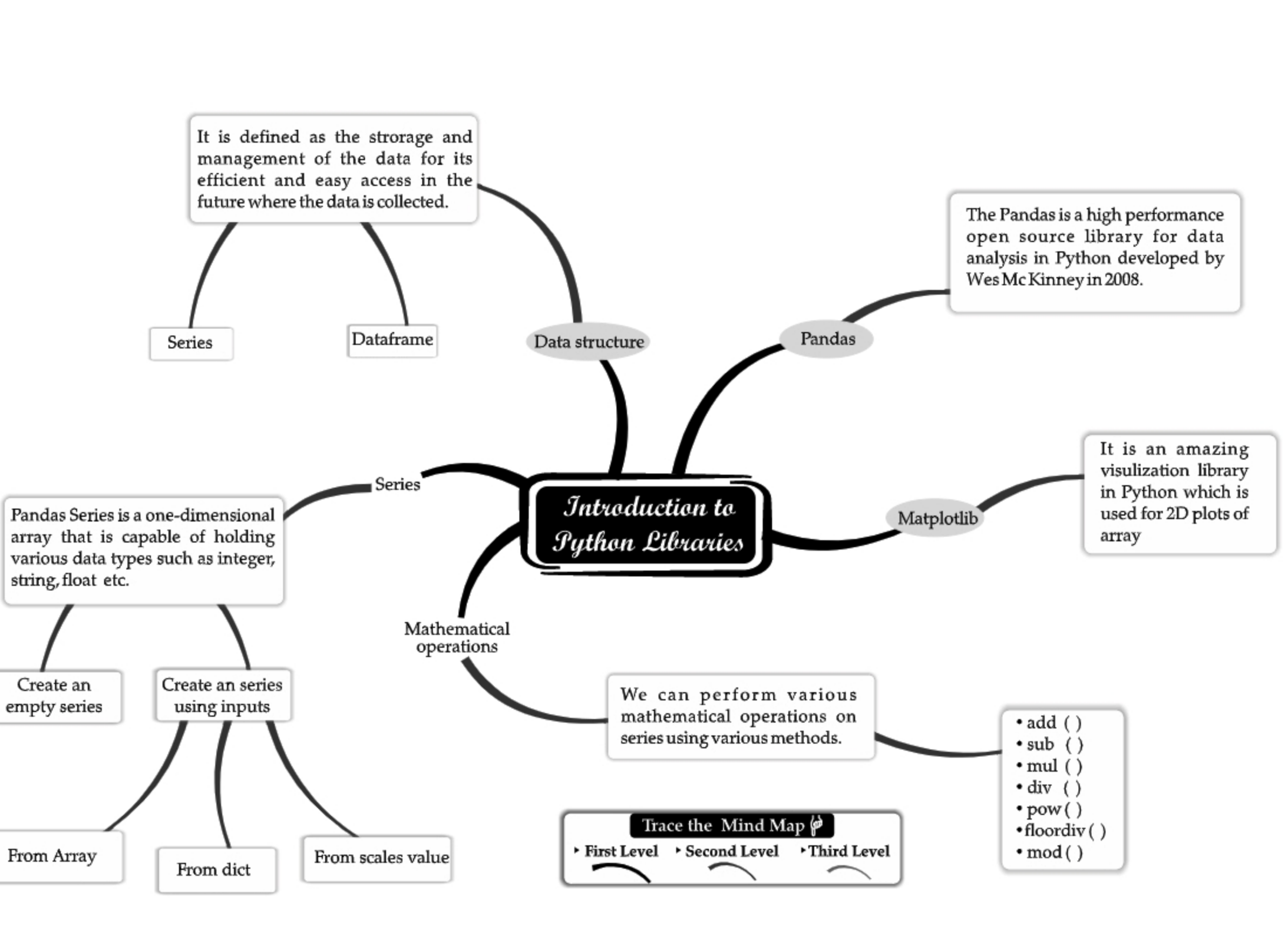
Using the Pandas, we can accomplish five typical steps in the processing and analysis of data, regardless of the origin of data. These steps are- load, prepare, manipulate, model and analyse.

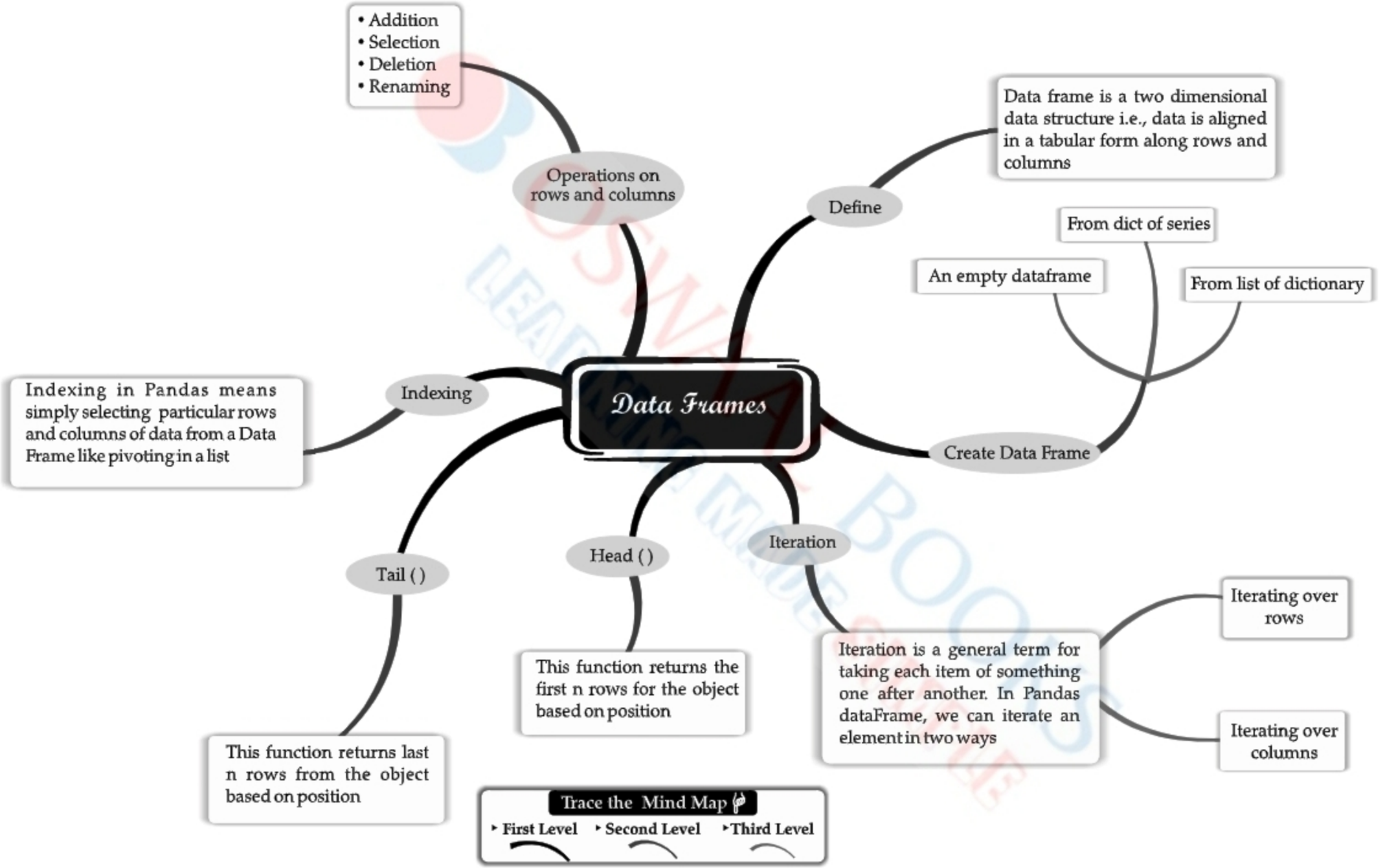
Some key features of Pandas include the following :

Scan to know more about this topic

Python Pandas Series Data Structure

(i) It can process a variety of data sets in different formats : time series, tabular heterogeneous arrays and matrix data.
(ii) It facilitates loading and importing data from varied sources such as CSV and DB/SQL.
(iii) It can handle a myriad of operations on data sets : sub-setting, slicing, filtering, merging, grouping, re-ordering, and re-shaping.
(iv) It can deal with missing data according to rules defined by the user and developer.
(v) It can be used for parsing and managing (conversion) of data as well as modeling and statistical analysis.
(vi) It integrates well with other Python libraries such as SciPy.
(vii) It delivers fast performance and can be speeded up even more by making use of Cython (C extensions to Python).


Introduction to Python Libraries
Data structure
It is defined as the strorage and management of the data for its efficient and easy access in the future where the data is collected.
Series
Dataframe
Pandas
The Pandas is a high performance open source library for data analysis in Python developed by Wes Mc Kinney in 2008.
Matplotlib
It is an amazing visulization library in Python which is used for 2D plots of array
Series
Pandas Series is a one-dimensional array that is capable of holding various data types such as integer, string, float etc.
Create an empty series
Create an series using inputs
From Array
From dict
From scales value
Mathematical operations
We can perform various mathematical operations on series using various methods.
• add ( )
• sub ( )
• mul ( )
• div ( )
• pow ( )
• floordiv ( )
• mod ( )
Trace the Mind Map
First Level
Second Level
Third Level


Data Frames
Operations on rows and columns
• Addition
• Selection
• Deletion
• Renaming
Define
Data frame is a two dimensional data structure i.e., data is aligned in a tabular form along rows and columns
Create Data Frame
From dict of series
An empty dataframe
From list of dictionary
Indexing
Indexing in Pandas means simply selecting particular rows and columns of data from a Data Frame like pivoting in a list
Head ( )
This function returns the first n rows for the object based on position
Tail ( )
This function returns last n rows from the object based on position
Iteration
Iteration is a general term for taking each item of something one after another. In Pandas dataFrame, we can iterate an element in two ways
Iterating over rows
Iterating over columns
Trace the Mind Map
First Level
Second Level
Third Level

➢ **Benefits of Pandas**

The benefits of pandas over using the languages are

- **Data representation :** It can easily represent data in a form naturally suited for data analysis through its DataFrame and Series data structures in a concise manner. Doing the equivalent in C/C++ or Java would require many lines of custom code, as these languages were not built for data analysis but rather networking and kernel development.
- **Clear code :** The clear API of the Pandas allows you to focus on the core part of the code. So, it provides clear code.

➢ **Matplotlib**

It is an amazing visualization library in Python that used for 2D plots of arrays. It is a multi-platform data visualization library which build NumPy arrays. Matplotlib produces publication-quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shell, web application servers and various graphical user interface toolkits.

To get matplotlib up and running in our environment, we need to import it.

import matplotlib pyplet as plt

➢ **Data structures in Pandas**

Data structure is defined as the storage and management of the data for its efficient and easy access in the future where the data is collected, modified and the various types of operations are performed on the data respectively. Pandas provides two data structures for processing the data, which are explained below :

(1) **Series :** It is one dimensional object similar to an array, list or column in a table. It will assign a labelled index to each item in the series. By default, each item will receive an index label from 0 to N, where N is the length of the series minus one.

(2) **Data Frame :** It is a tabular data structure comprised of rows and columns. DataFrame is defined as a standard way to store data which has two different indexes *i.e.*, row index and column index.

Scan to know more about this topic



Data Structure of Pandas

➢ **Series**

Pandas series is one-dimensional array that is capable of holding various data types such as integer, string, float, object etc. with the the help of series () method, we can easily change the list, dictionary into series. A series does not contain multiple columns and rows. Labels of series are called index.

Syntax

pandas.series (data, index, dtype, copy)

Here, data can be list, tuple etc

index value should be unique and hashable

dtype defines data type of series

copy copies the data

➢ **Creating a series**

(i) Create an empty series

Empty series means it will not have any value.

Syntax

series_Object = pandas.Series ()

(ii) Create a series using Inputs

We can create series by using various inputs as array.

- **Creating series from array :** To create a series from array, we have to import the numpy module and then use array () method. If data is an ndarray, then passed index must be of same length. If there is no index passed as an argument, then index will be range (n) by default, where n is array length.

- **Creating series from dict :** A dict can be passed as an input. If there is no index specified, then the dictionary's keys are taken in a sorted order. If index is passed, then corresponding values to a particular label in the index will be extracted from the dictionary.
- **Creating series from scalar :** If data is a scalar value, an index must be provided. The value will be repeated to match the length of index.

  Source : https://www.tutorialspoint.com/python_pandas_series.htm

➢ **Mathematical operations**

We can perform mathematical operation on series like addition, subtraction, multiplication, division etc.

For this, various methods are used, as follows :

- **add() :** This function is used to add series and others, element wise.

  Syntax Series.add (other, fill–value=Name, axis=0)

  Here Other is series or scalar value

  fill-value is None or float value but its default value is None
- **sub() :** This function is used to get subtraction of series and others, element wise.

  Syntax Series.sub (other, fill value=None, axis=0)
- **mul() :** This function is used to get multiplication of series and others, element-wise.

  Syntax Series.mul (other, fill value=None, axis=0)
- **div() :** This function is used to get floating division of series and others, element-wise.

  Syntex Series.div (other, fill value=Name, axis=0)
- **pow() :** This function is used to get exponential power of series and others, element-wise.

  Syntax Seires.pow (other, fill value=None, axis=0)

e.g.

```
import numpy as np
import pandas as pd
x = pd.Series([2, 1, 2, np.nan], index=['p', 'q', 'r', 's'])
y = pd.Series([1, np.nan, 2, 1], index=['p', 'q', 's', 't'])
print("---Addition---")
print(x.add(y, fill_value=0))
print("---Subtraction---")
print(x.sub(y, fill_value=0))
print("---Multiplication---")
print(x.mul(y, fill_value=0))
print("---Divsion---")
print(x.div(y, fill_value=0))
print("---Power---")
print(x.pow(y, fill_value=0))
```

Output :

	Addition	Subtraction	Multiplication	Division	Power
p	3.0	1.0	2.0	2.0	2.0
q	1.0	1.0	0.0	inf	1.0
r	2.0	2.0	0.0	inf	1.0

s	2.0	–2.0	0.0	0.0	0.0
t	1.0	1.0	0.0	0.0	0.0

dtype: float 64

- **Head and Tail functions**
  - head() function is used to get the first *n* rows.

    Syntax Series.head(n=5)

    Here, *n* is the selected number of rows. It is int type and has default value 5.
  - tail() function returns last *n* rows from the object based on position. It is useful for quickly verifying data. for example, after sorting

    Syntax Series.tail(*n* = 5)

    Here, *n* is the selected number of rows whose default value is 5.
- **Selection**

  In series, Series.select() function is used for selection. This function returns data corresponding to axis labels matching criteria. We pass the name of the function as an argument to this function which is applied on all the index tables. The index labels satisfying the criteria are selected.

  Syntax Series.select (crit, axis=0)

  Here,

  crit = called on each label

  axis = int value
- **Indexing**

  The object supports both integers and label based indexing and provides a host of methods for performing operation involving the index.

  In Python Pandas, Series.index attribute is used to get or set the index labels of the given series object.

  Syntax Series.index

  Pandas supports three types of multi-axes indexing, which are as follows :

  (i) **.loc[] :** This attribute is used to access a group of rows and columns by label(s) or a boolean array in the given series object.

  Syntax Series.loc

  (ii) **.iloc[] :** This attribute enables purely integer location based indexing for selection by position over the given series object

  (iii) **.ix[] :** This attribute is primarily label location based indexer, with integer position fallback. It takes the label as input and returns the value corresponding to that label.

  Syntax Series.ix
- **Slicing**

  Slicing is a powerful approach to retrieve subsets of data from a Pandas object. A slice Object is built using a syntax of start : end : step, the segments representing the first item, last item and the increment between each item that you would like as the step.

Know the Terms

- **Pandas :** The Pandas is a high-performance open source library for data analysis in Python.
- **Matplotlib :** It is a visualization library in Python that used for 2D plots of arrays.
- **Series :** It is a one-dimensional array containing a sequence of values. Each value has a data label associated with it also called its index.

- **Selection :** This function returns data corresponding to axis labels matching criteria.
- **Indexing :** This function is used to get or set the index labels of the given series object.
- **Slicing :** Slicing is a powerful approach to retrieve subsets of data from a Pandas object.

Data Frames & Operation on Rows and Columns

- **Data Frames**
  - Data Frame is a two dimensional data structure *i.e.*, data is aligned in a tabular form as rows and columns.

    Data frame consists of various properties as iteration, indexing etc.

    Scan to know more about this topic

    Python Pandas Data frame Basics
  - In data frame, columns can be heterogeneous types like integer, boolean etc.
  - It can be seen as a dictionary of series where rows and columns both are indexed.

    Data can be created using following syntax :

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

    Here **data** contains different forms like ndarray, series, map, constants etc.

    index is used for the row label

    columns is used for column label

    dtype refers to the data type of each column

    copy used for copying data

- **Create DataFrame**

  We can create DataFrame using various inputs which are discussed below
  - **Creating an empty DataFrame :** It is basic DataFrame that can be created by

    import pandas as pd

    object_Name = pd.DataFrame()
  - **Creating a DataFrame From dict of series :** Dictionary of series can be passed to form a DataFrame. The resultant index is the union of all the series indexes passed.

    e.g.

```
import pandas as pd
data={'First' : pd.Series (['abc', 'xyz', 'pqr'], index = [11, 12, 13]),
      'second' : pd.Series (['The', 'That', 'This', 'abc'],
                  index=[11, 12, 13, 14])}
value=pd.DataFrame(data)
print(value)
```

    Output

	First	Second
11	abc	The
12	xyz	That
13	pqr	This
14	NaN	abc

  - **Creating a DataFrame From list of dictionary :** List of dictionary can be passed to form a DataFrame. Keys of dictionary are taken as column names by default.

    e.g.

```
import pandas as pd
data = [{'abc' : 10, 'xyz' : 20, 'pqr' : 30},
        {'The' : 10, 'pqr' : 20, 'xyz' : 30, 'abc' : 40}]
```

```
value = pd.DataFrame (data)
print(value)
```

Output

	The	abc	pqr	xyz
0	NaN	10	30	20
1	10.0	40	20	30

➢ **Iterating in Pandas DataFrame**

Iteration is a general term for taking each item of something one after another.

In Pandas DataFrame, we can iterate an element in two ways :

(i) Iterating over rows : There are three function to iterate over rows as follows :

- **iterrows() :** It returns the iterator yielding each index value along with a series containing the data in each row.
- **iteritems() :** It iterates over each column as key, value pair with label as key and column value as series object.
- **itertuples() :** In DataFrame, it returns a tuple for each row. The first element of the tuple will be the row's corresponding index value, while the remaining value are the rows values.

(ii) Iterating over columns

In order to iterate over columns, we need to create a list of dataframe columns and then iterating through that list to pull out the dataframe columns.

➢ **Operations on rows and columns**

As we known, DataFrame is a two dimensional data structure means data is arranged in a tabular format like rows and columns, some basic operations can be perform like adding, deleting, selecting and renaming. These operations are as follows :

(i) Addition

- To add a column in Pandas Dataframe, a new list as a column can be declared and add to an existing DataFrame.
- To add a row in Pandas DataFrame, we can concat the old dataframe with new one.

(ii) Selection

- To select a column in Pandas DataFrame, we can either access the columns by calling them by their column names.
- To retrieve rows from a DataFrame, a special method is used named DataFrame.loc[]. Rows can also be selected by passing integer location to iloc[] method.

(iii) Deletion

- To delete a column from Pandas DataFrame, drop() method is used. Columns are deleted by dropping columns with column names.
- To delete a row from Pandas DataFrame, drop() method is used. Rows are deleted by dropping rows by index label.

➢ **Head and Tail functions**

head() and tail() methods or functions are used to view a small sample of a DataFrame object. These functions are described below

(i) head() : This function returns the first n rows for the object based on position. It is useful for quick testing if your object has the right type of data in it.

Syntax DataFrame.head (n=5)

Parameters : n-is an integer value, number of rows to be returned where default value is 5. Return DataFrame with top n rows

(ii) tail() : This function returns last n rows from the object based on position. It is useful for quickly verifying data. *e.g.* after sorting

Syntax : DataFrame.tail (n=5)

➢ **Indexing using Labels**

Indexing in Pandas means simply selecting particular rows and columns of a DataFrame. Indexing can also be known as subset selection.

It is common operation to pick out one of the DataFrame's columns to work on. To select a column by its label, we use the .loc[] function.

Pandas DataFrame.loc attribute access a group of rows and columns by label(s) or a boolean array in the given DataFrame.

Syntax : DataFrame.loc

loc takes two single/list/range operator separated by ','. The first one indicates the row and the second one indicates columns.

➢ **Boolean Indexing :**

It 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.

In boolean indexing, we can filter a data in four ways

- Accessing a DataFrame with a boolean index
- Applying a boolean mask to a dataFrame
- Masking data based on column value
- Masking data based on index value

e.g.,
```
import pandas as pd
dict={'Name' : ["Rahul", "Kiyaan", "Shreya", "Riya"],
      "Salary" : ["28000", "38000", "34000", "3600"]}
info=pd.DataFrame(dict, index=[True, False, False, True])
print (info)
```

Output

	Name	Salary
True	Rahul	28000
False	Kiyaan	38000
False	Shreya	34000
True	Riya	36000

➢ **CSV File**

CSV files are the comma separated values. This type of file can be view as an excel file and separated by commas. CSV file is nothing more than a simple text file. However, it is the most common, simple and easiest method to store tabular data. This particular format arranges tables by a specific structure divided into rows and columns.

Once we have the DataFrame, we can persist it in CSV on the local disk. Let's first create CSV file using data that is currently present in the DataFrame, we can store the data of this DataFrame in CSV format using API called to_CSV (…) of Pandas

➢ **Importing/Exporting Data between CSV files and DataFrames**

- Pandas **read_csv()** function is used to import a CSV file to DataFrame format.

  Syntax df.read_csv('file_name.CSV', header=None)

  Here,

  Header allows you to specify which row will be used as column names for your DataFrame. Expected int value or a list of int values. If your file does not have a header, then simply set header=None

- To export a Pandas DataFrame to a CSV file, use **to_csv** function. This saves a DataFrame as a CSV file.

  Syntax to_csv(parameters)

STAND ALONE MCQs (1 Mark each)

Q. 1. Pandas is an open-source _____ Library?

(A) Ruby **(B)** Javascript

(C) Java **(D)** Python

Ans. Option (D) is correct.

> ***Explanation :*** Pandas is an open-source Python Library providing high-performance data manipulation and analysis tool using its powerful data structures.

AI **Q. 2.** Pandas key data structure is called?

(A) Keyframe **(B)** DataFrame

(C) Statistics **(D)** Econometrics

Ans. Option (B) is correct.

> ***Explanation :*** Pandas is built on the Numpy package and its key data structure is called the DataFrame.

Q. 3. In pandas, Index values must be?

(A) unique

(B) hashable

(C) Both A and B

(D) None of the above

Ans. Option (C) is correct.

> ***Explanation :*** Index values must be unique and hashable, same length as data. Default np.arrange(n) if no index is passed.

Q. 4. In data science, which of the python library are more popular ?

(A) Numpy

(B) Pandas

(C) OpenCv

(D) Django

Ans. Option (B) is correct.

> ***Explanation :*** Pandas is an essential package for Data Science in Python because it's versatile and really good at handling data.

AI **Q. 5.** We can analyze the data in pandas with :

(A) Series

(B) DataFrame

(C) Both of the above

(D) None of the above

Ans. Option (C) is correct.

> ***Explanation :*** Pandas is the most popular python library that is used for data analysis. It provides highly optimized performance with back-end source code is purely written in C or Python.
> We can analyze data in pandas with :
> Series
> DataFrames

Q. 6. Which of the following thing can be data in Pandas?

(A) a python dict

(B) anndarray

(C) a scalar value

(D) all of the mentioned

Ans. Option (D) is correct.

> ***Explanation :*** The passed index is a list of axis labels.

Q. 7. Which of the following input can be accepted by Data Frame?

(A) Structured ndarray

(B) Series

(C) DataFrame

(D) All of the mentioned

Ans. Option (D) is correct.

> ***Explanation :*** DataFrame is a 2-dimensional labeled data structure with columns of potentially different types.

Q. 8. Which of the following indexing capabilities is used as a concise means of selecting data from a pandas object?

(A) In **(B)** ix

(C) ipy **(D)** iy

Ans. Option (B) is correct.

> ***Explanation :*** ix and reindex are 100% equivalent.

AI **Q. 9.** Given a Pandas series called sequences, the command which will display the first 4 rows is _____.

(A) print (sequences.head(4))

(B) print (sequences.Head(4))

(C) print (sequences.heads(4))

(D) print (sequences.Heads(4))

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Ans. Option (A) is correct.

> *Explanation :* A sequence is a group of items with a deterministic ordering.
> Pandas head() method is used to return top n (5 by default) rows of a data frame or series

Q. 10. Which of the following input can be accepted by DataFrame?

(A) Structured ndarray

(B) Series

(C) DataFrame

(D) All of the mentioned

Ans. Option (D) is correct.

> *Explanation :* DataFrame is a 2-dimensional labeled data structure with columns of potentially different types.

AI **Q. 11.** Which object do you get after reading a CSV file using pandas.read_csv()?

(A) Dataframe

(B) Nd array

(C) Char Vector

(D) None

Ans. Option (D) is correct.

> *Explanation :* Pandas read_csv() method is used to read CSV file into DataFrame object. The CSV file is like a two-dimensional table where the values are separated using a delimiter.

Q. 12. Which of the following indexing capabilities is used as a concise means of selecting data from a pandas object?

(A) In **(B)** ix

(C) ipy **(D)** iy

Ans. Option (B) is correct.

> *Explanation :* ix and reindex are 100% equivalent.

Q. 13. Which of the following statement(s) is/are correct with respect to df.columns properties to rename columns

1. All columns must be specified
2. Columns must be in the form of a list
3. Old column names not required
4. Columns can be specified with columns number

(A) Only 1 is correct

(B) 1, 2 and 3 are correct

(C) 1 and 3 are correct

Ans. Option (B) is correct.

> *Explanation :* The columns can also be renamed by directly assigning a list containing the new names to the columns attribute of the dataframe object for which we want to rename the columns.

Q. 14. df.index properties can be used to

(A) rename rows

(B) rename columns

(C) rename rows and columns both

(D) None of these

Ans. Option (A) is correct.

> *Explanation :* The index property returns an object of type Index.

Q. 15. To display 2 rows from the top in the dataframe, which of the following statement is correct:

(A) df.head()=2

(B) df.head(n=2)

(C) df.head(range(2))

(D) All of the above

Ans. Option (B) is correct.

> *Explanation :* In Python's Pandas module, the Dataframe class provides a head() function to fetch top rows from a Dataframe

Q. 16. What will be syntax for pandasdataframe?

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

(B) pandas.DataFrame(data, index, rows, dtype, copy)

(C) pandas_DataFrame(data, index, columns, dtype, copy)

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

Ans. Option (D) is correct.

> *Explanation :* Pandas DataFrame is two-dimensional size-mutable, potentially heterogeneous tabular data structure with labeled axes (rows and columns).

AI **Q. 17.** The command used to skip a row in a CSV file is

(A) next() **(B)** skip()

(C) omit() **(D)** bounce()

Ans. Option (A) is correct.

> *Explanation :* Use csv. reader() and next() to skip the first line of a . csv file.

Q. 18. What is the output of the following program?

```
d=csv.reader(open('c:\PYPRG\ch13\ city.csv'))
next(D)
for row in d:
print(row)
```

if the file called "city.csv" contain the following details

chennai,mylapore

mumbai,andheri

(A) chennai,mylapore

(B) mumbai,andheri

(C) chennaimumbai

(D) chennai,mylapore mumbai, Andheri

Ans. Option (B) is correct.

> ***Explanation :*** csvreader is an iterable object. Hence, .next() method returns the current row and advances the iterator to the next row.

Q. 19. A CSV file is also known as a ….

(A) Flat File

(B) 3D File

(C) String File

(D) Random File

Ans. Option (A) is correct.

> ***Explanation :*** A CSV is a comma-separated values file, which allows data to be saved in a tabular format.

Q. 20. Which of the following module is provided by Python to do several operations on the CSV files?

(A) py **(B)** xls

(C) csv **(D)** os

Ans. Option (C) is correct.

> ***Explanation :*** Python provides a module named csv, using this we can do several operations on the csv files.

AI **Q. 21.** In a data frame axis -0 is for

(A) Columns

(B) Rows

(C) Rows and Columns both

(D) None of these

Ans. Option (B) is correct.

> ***Explanation :*** A DataFrame object has two axes: "axis 0" and "axis 1". "axis 0" represents rows and "axis 1" represents columns.

Q. 22. Which function from the options given below can read the dataset from a large text file?

(A) read_json **(B)** read_pickle

(C) read_hdf **(D)** read_csv

Ans. Option (D) is correct.

> ***Explanation :*** The Pandas read_csv() function returns a new DataFrame with the data and labels from the file data.csv, which you specified with the first argument.

Q. 23. Which function needs a dictionary of array like sequences or a dictionary of another dictionary, to return a DataFrame?

(A) DataFrame.from_items

(B) DataFrame.from_records

(C) DataFrame.from_dict

(D) All of the above

Ans. Option (A) is correct.

> ***Explanation :*** DataFrame.from_dict operates like the DataFrame constructor except for the orient parameter which is 'columns' by default.

AI **Q. 24.** Data structures in Pandas can be mutated in the terms of ____ but not of _____.

(A) size, value **(B)** value, size

(C) semantic, size **(D)** none of the above

Ans. Option (B) is correct.

> ***Explanation :*** The length of a Series cannot be changed.

Q. 25. Minimum number of arguments we require to pass in pandas series :

(A) 0 **(B)** 1

(C) 2 **(D)** 3

Ans. Option (C) is correct.

> ***Explanation :*** Pandas Series is a one-dimensional labeled array capable of holding data of any type (integer, string, float, python objects, etc.).

ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions a statement of Assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(A) Both Assertion (A) and reason (R) are true and reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and reason (R) are true but reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion **(A)** is false but reason (R) is true.

Q.1. Assertion (A) : To create a series from array, we have to import the numpymodule and then use array () method.

Reason (R) : NumPy is an open-source numerical Python library. NumPy contains a multi-dimensional array and matrix data structures.

Ans. Option (A) is correct.

> ***Explanation :*** NumPy, which stands for Numerical Python, is a library consisting of multidimensional array objects and a collection of routines for processing those arrays. Using NumPy, mathematical and logical operations on arrays can be performed. NumPy is a Python package. For most data types, pandas uses NumPy arrays as the concrete objects contained with a Index , Series , or DataFrame.

Q.2. Assertion (A) : You need to import or load the Pandas library first in order to use it.

Reason (R) : The "pd" is an alias or abbreviation which will be used as a shortcut to access or call pandas functions.

Ans. Option (B) is correct.

> ***Explanation :*** By "Importing a library", it means loading it into the memory and then you can use it. Run the following code to import pandas library : import pandas as pd

Q.3. Assertion (A) : In Python Pandas, Series.index attribute is used to get or set the index labels of the given series object.

Reason (R) : ix[] attribute is used to access a group of rows and columns by label (s) or a boolean array in the given series object.

Ans. Option (C) is correct.

> ***Explanation :*** .loc[] attribute is used to access a group of rows and columns by label (s) or a boolean array in the given series object.
> .ix[] attribute is primarily label location based indexer, with integer position fallback. It takes the label as input and returns the value corresponding to that label.

Q.4. Assertion (A) : In series, Series.selection() function is used for selection.

Reason (R) : tail() function returns last n rows from the object based on position. It is useful for quickly verifying data.

Ans. Option (D) is correct.

> ***Explanation :*** In series, Series.select() function is used for selection. This function returns data corresponding to axis labels matching criteria. We pass the name of the function as an argument to this function which is applied on all the index tables.
> Pandas tail() method is used to return bottom n (5 by default) rows of a data frame or series.
> Syntax: Dataframe.tail(n=5).

Q.5. Assertion (A) : Matplotlib is a visualization library in Python that used for 2D plots of arrays.

Reason (R) : Indexing function is used to get or set the index labels of the given series object.

Ans. Option (B) is correct.

> ***Explanation :*** Matplotlibis a multi-platform datavisualization library which build NumPy arrays. Matplotlib produces publication-quality figures in a variety ofhardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, thePython and IPython shell, web application servers and various graphical user interface toolkits.
>
> In Python Pandas, Series.index attribute is used to get or set the index labels of the given series object.

Q.6. Assertion (A) : DataFrame is a two dimensional labelled array. It's columns types can be heterogeneous i.e., of varying types.

Reason (R) : We need a DataFrame witha boolean index to use the boolean indexing.

Ans. Option (B) is correct.

> ***Explanation :*** Pandas DataFrame is two-dimensional size-mutable, potentially heterogeneous tabular data structure with labelled axes (rows and columns).
> Boolean indexing is a type of indexing which uses actual values of the data in the DataFrame.

Q. 7. Assertion (A) : CSV files are available to open in any spreadsheet program, including Google Sheets, Open Office, and Microsoft Excel.

Reason (R) : Using a spreadsheet program can serve a user's needs better since it has cells where data is sorted in rows and columns.

Ans. Option (A) is correct.

Explanation : A CSV file stores data, both numbers and text in a plain text. All fields are separated by commas while all records are separated by an elaborate line of characters. A spreadsheet program sorts the data in a CSV file systematically via columns. This helps to filter all the contents in the file.

Q. 8. Assertion (A) : Iteration is a general term for taking each item of something one after another.

Reason (R) : itertuples()the iterator yielding each index value along with a series containing the data in each row.

Ans. Option (C) is correct.

Explanation : Iteration is the repetition of a process in order to generate an outcome. The sequence will approach some end point or end value. Each repetition of the process is a single iteration, and the outcome of each iteration is then the starting point of the next iteration.
iterrows() returns the iterator yielding each index value along with a series containing the data in each row.

Q. 9. Assertion (A) : Indexing can also be known as sub selection.

Reason (R) : Pandas DataFrame.loc attribute access a group of rows and columns by label(s) or a boolean array in he given DataFrame.

Ans. Option (D) is correct.

Explanation : Indexing can also be known as subset selection.
loc takes two single/list/range operator separated by ','. The first one indicates the row and the second one indicates columns.



CASE-BASED MCQs

Attempt any four sub-parts from each question. Each sub-part carries 1 mark.

I. Consider the following DataFrame df and answer any four questions from 1-5

Roll no.	Name	UT1	UT2	UT3	UT4
1	Prerna Singh	24	24	20	22
2	Manish Arora	18	17	19	22
3	Tanish Goel	20	22	18	24
4	Falguni Jain	22	20	24	20

Q. 1. Write down the command that will give the following output. 1

```
Roll no.        6
Name        Tanish Goel
UT1            24
UT2            24
UT3            24
UT4            24
dtype : object
```

(A) print (df.max)

(B) print df.max( )

(C) print (df.max (axis=1))

(D) print (df.max, axis=1)

Ans. Option (A) is correct.

Explanation : max() function returns the maximum of the values in the given object.

Q. 2. The teacher needs to know the marks scored by the student with roll number 4. Help her to identify the correct set of statements from the given option :

(A) df1=df[rollno==4] print (df1)

(B) df1=df[rollno==4] print (df1)

(C) df1=df [df.rollno=4] print (df1)

(D) df1=df [df.rollno==4] print (df1)

Ans. Option (A) is correct.

Explanation : When we apply ==, >, <, <=, >= operator on dataframe then it produce a Series of True and False.

Q. 3. Which of the following statements will give the exact number of values in each column of the dataframe?

(i) print (df.count ())

(ii) print (df.count (0))

(iii) print (df.count)

(iv) print (df.count (axis'index')

Choose the correct option :

(A) both (i) and (ii)

(B) only(ii)

(C) (i), (ii) and (iii)

(D) (i), (ii) and (iv)

Ans. Option (A) is correct.

Explanation : Pandas dataframe.count() is used to count the no. of non-NA/null observations across the given axis. It works with non-floating type data as well.

Q. 4. Which of the following command will display the column of the DataFrame?

(A) print (df.column ())

(B) print (df.columns ())

(C) print (df.column)

(D) print (df.columns)

Ans. Option (A) is correct.

Explanation : Pandas DataFrame. columns attribute return the column labels of the given Dataframe.

Q. 5. Ms. Sharma the class teacher wants to add a new column, the scores of Grade with the values, 'A','B','A','A','B','A', to the DataFrame. Help her choose the command to do so :

(A) df.column=['A','B','A','A','B','A']

(B) df['Grade']=['A','B','A','A','B','A']

(C) df.loc['Grade']=['A','B','A','A','B','A']

(D) Both **(B)** and **(C)** are correct

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Ans. Option (B) is correct.

Explanation : Programmers can use to add a column to DataFrame is by generating a new list as a separate column of data and appending the column to the existing DataFrame.

II. Consider the following DataFrame df and answer any four questions from 1-5

ID	Name	Age	Fav_Color	Points
T01	Rahul Anand	32	Blue	73
T02	Mohak Girdhar	25	Green	82
T03	Rajeev Tyagi	45	Orange	29
T04	Rohini Malik	30	Pink	39

Q. 1. Write down the command that will add a column "eligible" with default values as 'yes'.

(A) df('eligible')='yes'

(B) df['eligible']='yes'

(C) df('eligible')='yes'

(D) df.Insert['eligible'='yes']

Ans. Option (B) is correct.

Explanation : Use the syntax pd. Dataframe[new_column] = value to add a column named new_column with each element as value to pd.

Q. 2. Write the command to extract the complete row 'T03'.

(A) df.loc[:, 'ID']

(B) df.loc['T03', 'Name']

(C) df.loc['T02', 'T03']

(D) df.loc['T03',:]

Ans. Option (D) is correct.

Explanation : DataFrame.loc[] method is a method that takes only index labels and returns row or dataframe if the index label exists in the caller data frame.

Q. 3. For the above DataFrame, following statement is given error :
df[Age]=df[Points]*2/3
Find and correct the error.
(A) df['Age']=df['Points']*2/3
(B) df[Age]=df['Points']*2/3
(C) df['Age']=df[Points]*2/3
(D) df['Age']=df['Points'*2/3]

Ans. Option (A) is correct.

Q. 4. Write the statement to list the first three entries of the DataFrame 'df'.

(A) df.head()

(B) df.head(3)

(C) df.head('3')

(D) All of the above

Ans. Option (B) is correct.

Explanation : head(n) to get the first n rows of the DataFrame. It takes one optional argument n (number of rows you want to get from the start). By default n = 5, it return first 5 rows if value of n is not passed to the method.

Q. 5. Which command will be used to drop a row from dataframe 'df' labelled as 'T04' ?

(A) Df.drop() **(B)** df.drop()

(C) df.drop('T04') **(D)** df.drop(T04)

Ans. Option (C) is correct.

III. Consider the following dataframe df as shown below :

	Name	Eng.	IP	Geo	Total
T1	Kushagra	52	98	85	235
T2	Naresh	48	85	88	221
T3	Prakhar	69	94	78	241
T4	Trapti	70	81	91	242

Q. 1. Which command will give the output 20 :

(A) print(df.size) **(B)** print(df.shape)

(C) print(df.index) **(D)** print(df.axes)

Ans. Option (A) is correct.

> ***Explanation*** *:* Returns size of dataframe/ series which is equivalent to total number of elements.

Q. 2. What will be the output produced by following statements ?

>>>print(df.at['T3', 'total'], df.at['T1', 'ip'])

(A) 235 **94**

(B) 241 **98**

(C) 241 **94**

(D) 235 **98**

Ans. Option (B) is correct.

> ***Explanation :*** Pandas at[] is used to return data in a dataframe at the passed location.

Q. 3. What will be the output produced by following statements ?

>>>print(dff.loc['T2' : 'T3' , 'ip':'geo'])

(A)

	IP	Geo
T2	85	88
T3	94	78

(B)

	IP
T2	85

(C)

	IP	Geo
T2	85	88

(D)

	IP
T2	85
T3	94

Ans. Option (A) is correct.

> ***Explanation*** *:* DataFrame.loc[] method is a method that takes only index labels and returns row or dataframe if the index label exists in the caller data frame.

Q. 4. What will be the output produced by following statements ?

>>> print(df.at[2,1],df.at[1,2])

(A) Prakhar **69**

(B) T2 **Naresh**

(C) Khushagra **52**

(D) 69 **85**

Ans. Option (D) is correct.

> ***Explanation :*** Pandas at[] is used to return data in a dataframe at the passed location.

Q. 5. What will be the output produced by following statements?

>>> print(df.iloc[::2,0::4])

(A)

	Name	Total
T1	**Kushagra**	**235**
T2	**Naresh**	**221**

(B)

	Name	Total
T2	**Naresh**	**221**
T4	**Trapti**	**242**

(C)

	Name	Total
T1	**Kushagra**	**235**
T3	**Prakhar**	**241**

(D)

	Name	Total
T3	**Prakhar**	**241**
T4	**Trapti**	**242**

Ans. Option (C) is correct.

> ***Explanation*** *:* Dataframe.iloc[] method is used when the index label of a data frame is something other than numeric series of 0, 1, 2, 3….n or in case the user doesn't know the index label. Rows can be extracted using an imaginary index position which isn't visible in the data frame.

IV. Consider the following DataFrame emp and answer any four question from 1-5

Emp-no	Name	Dept	Salary	Experience (in years)
1	Ram singh	IT	15000	2.5
2	Shyam singh	HR	18000	3
3	Nidhi gupta	IT	9000	2
4	Puja sharma	EXE	24000	8
5	Rohan Malik	HR	20000	6

Q. 1. Write down the command that will given the following output.

Empno 5

Name Shyam singh

Dept HR

Salary 24000

Experience 8

dtype : object

(A) print(emp.max)

(B) print(emp.max( ))

(C) print(emp.max(axis=1))

(D) print(emp.max.axis=1)

Ans. Option (B) is correct.

> ***Explanation*** *:* max() function returns the maximum of the values in the given object.

Q. 2. The CEO needs to know the salary of the employee with empno 4. Help him to identify the correct set of statement/s from the given option :

(A)
```
emp1=emp[emp['empno']==4]
print(emp1)
```

(B)
```
emp1=emp[emp]
print(emp1)
```

(C)
```
emp1=emp[emp.empno=4]
print(emp1)
```

(D)
```
emp1=emp[emp.empno==4]
print(emp1)
```

Ans. Option (A,D) is correct.

Q. 3. Which of the following statement/s will give the exact of values in each column of the dataframe ?

i. print(emp.count())

ii. print(emp.count(0))

iii. print(emp.count)

iv. print(emp.count(axis='index'))

Choose the correct option :

(A) both i and ii

(B) only ii

(C) i, ii and iii

(D) i, ii and iv

Ans. Option (A) is correct.

> ***Explanation :*** Pandas dataframe.count() is used to count the no. of non-NA/null observations across the given axis. It works with non-floating type data as well.

Q. 4. Which of the following command will display the column labels of the DataFrame?

(A) print(emp.columns())

(B) print(emp.column())

(C) print(emp.column)

(D) print(emp.columns)

Ans. Option (A) is correct.

> ***Explanation*** *:* Pandas DataFrame.columns attribute return the column labels of the given Dataframe.

Q. 5. Mr. Satvik Ahuja, the CEO wants to add a new column, the rating of the performance of employees with the values, 'A', 'A', 'B', 'A', 'B', to the DataFrame. Help him choose the command to do so.

(A) emp.column=['A', 'A', 'B', 'A', 'B']

(B) emp['Performance']=['A', 'A', 'B', 'A', 'B']

(C) emp.loc['Performance']= ['A', 'A', 'B', 'A', 'B']

(D) Both **(B)** and **(C)** are correct.

Ans. Option (B) is correct.

> ***Explanation :*** Programmers can use to add a column to DataFrame is by generating a new list as a separate column of data and appending the column to the existing DataFrame.

❐❐❐

CHAPTER

2 DATA VISUALIZATION

Syllabus

- *Data Visualization : Purpose of plotting, drawing and saving of plots using Matplotlib (line plot, bar graph, histogram).*
- *Customizing plots:; adding label, title, and legend in plots.*

Revision Notes

- Data visualization is the presentation of data in graphical format. It helps people understand the significance of data by summarizing and presenting a huge amount of data in a simple and easy to understand format and helps communicate information clearly and effectively.
- **Plotting using Matplotlib**
  - The Matplotlib Python library developed by John Hunter and many other contributors, is used to create high quality graphs, charts and figures.
  - Matplotlib produces publication quality figures in a variety of hardcopy format and interactive environments across platforms. It can be used in Python scripts, the Python and IPython shell, web application servers and various graphical user interface toolkits.
  - For installation of matplotlib in various operating system such as windows, Linux, MacOS, etc., use following command at command prompt :

    Python -m pip install -U matplotlib
  - Importing matplotlib

    from matplotlib import pyplot as plt

    OR

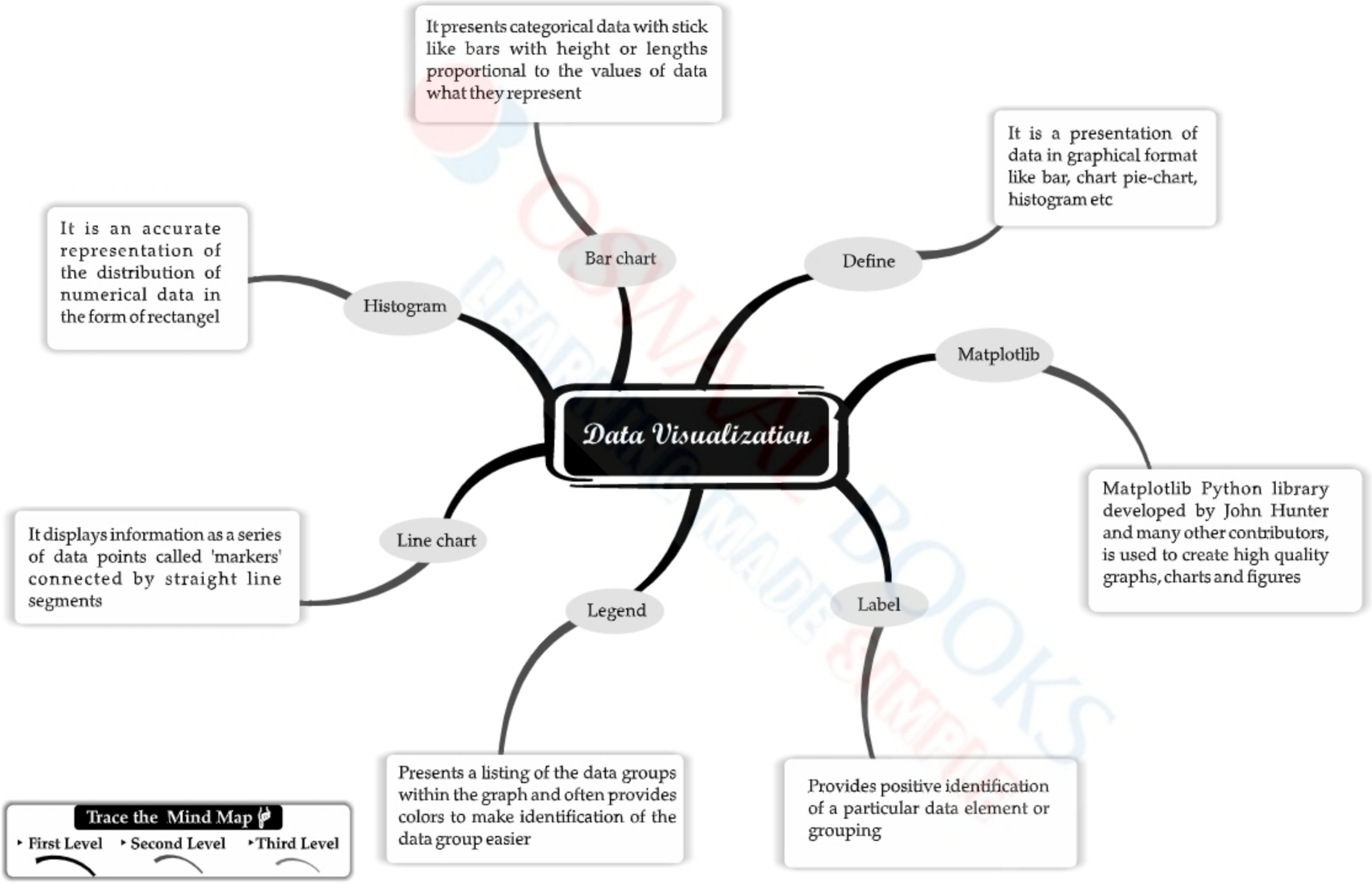
    import matplotlib.pyplot as plt
  - Plotting using matplotlib provides a brief introduction to plotting in Pandas using matplotlib. The matplotlib API is imported using the standard convention.
  - pyplot is a module in the matplotlib package. This module provides an interface that allows you to implicitly and automatically create figures and axes to achieve the desired plot.

    e.g.,

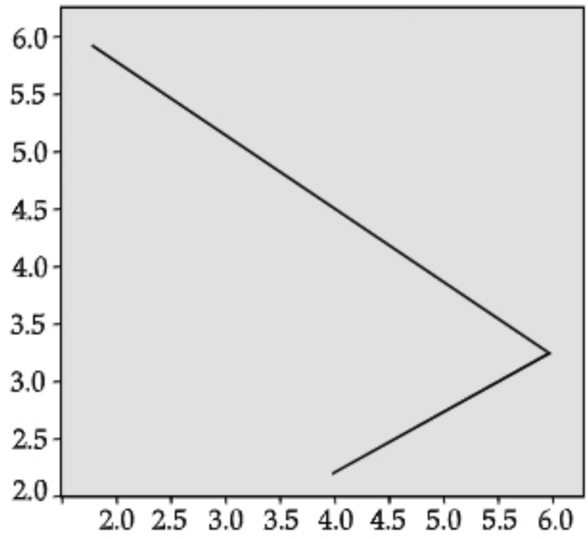
    from matplotlib import pyplot as plt

    plt.plot ([4, 6, 2], [2, 3, 6])

    plt.show()


Data Visualization
Bar chart
It presents categorical data with stick like bars with height or lengths proportional to the values of data what they represent
Define
It is a presentation of data in graphical format like bar, chart pie-chart, histogram etc
Histogram
It is an accurate representation of the distribution of numerical data in the form of rectangel
Matplotlib
Matplotlib Python library developed by John Hunter and many other contributors, is used to create high quality graphs, charts and figures
Line chart
It displays information as a series of data points called 'markers' connected by straight line segments
Legend
Presents a listing of the data groups within the graph and often provides colors to make identification of the data group easier
Label
Provides positive identification of a particular data element or grouping
Trace the Mind Map
First Level
Second Level
Third Level

Output



Scan to know more about this topic

Data visualization in python using matplotlib, pandas and numpy

➢ **Line Plot**

For all matplotlib plots, we start by creating a figure and an axes.

The figure (an instance of the class plt. figure) can be thought of as a single container that contains all the objects represented axes, graphics, text and labels.

The axes (an instance of the class plt. axes) is a bounding box with ticks and labels, which will eventually contain the plot elements that make up our visualization. If we want to create a single figure with multiple lines, we can simple call the plot function multiple times :

e.g,. import matplotlib.pyplot as plt

import numpy as np

fig = plt.figure()

ax = plt.axes()

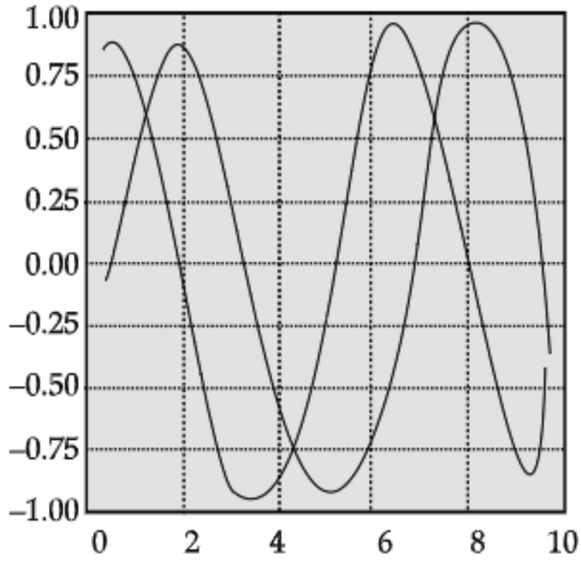
x = np.linspace(0, 10,1000)

ax.plot(x, np.sin(x))

plt.plot(x, np.sin(x))

plt.plot(x, np.cos(x))

Output



➢ **Plotting Bar Graph**

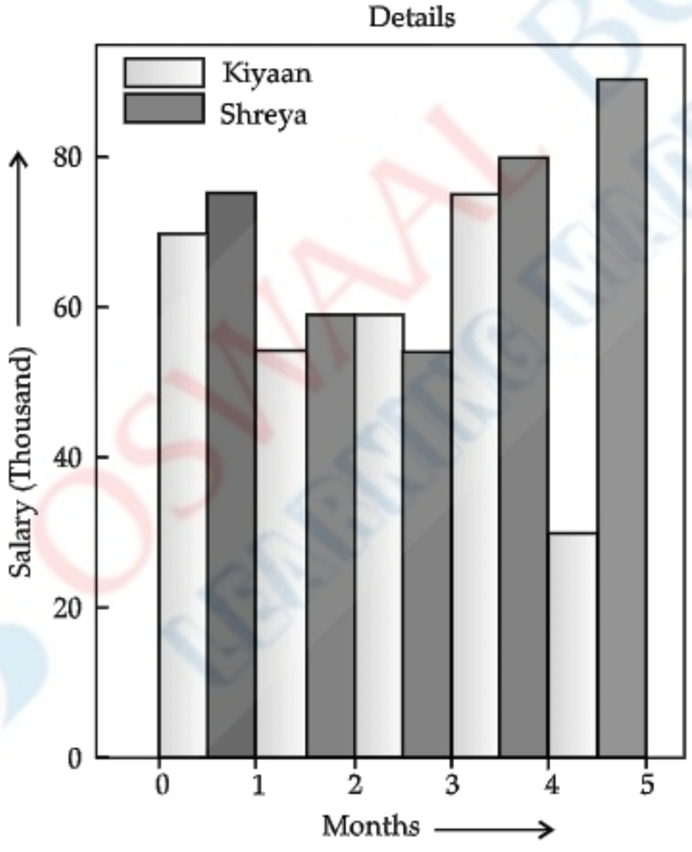
Categorical data can be represented in rectangular blocks with different heights or lengths proportional to the values. Such a type or representation is called a bar chart. The bar chart can be plotted vertically or horizontally.

A bar graph uses bars to compare data among different categories.

e.g.,

```
from matplotlib import pyplot as plt
import numpy as np
plt.bar([0.25, 1.25, 2.25, 3.25, 4.25], [70, 50, 60, 75, 30],
label="Kiyaan",width=.5)
plt.bar([.75, 1.75,2.75,3.75,4.75],[75, 60, 50, 80, 93],
label ="Shreya",color='r',width=.5)
plt.legend()
plt.xlabel('Month')
plt.ylabel('Salary (Thousand)')
plt.title('Details')
```

Output



Scan to know more about this topic

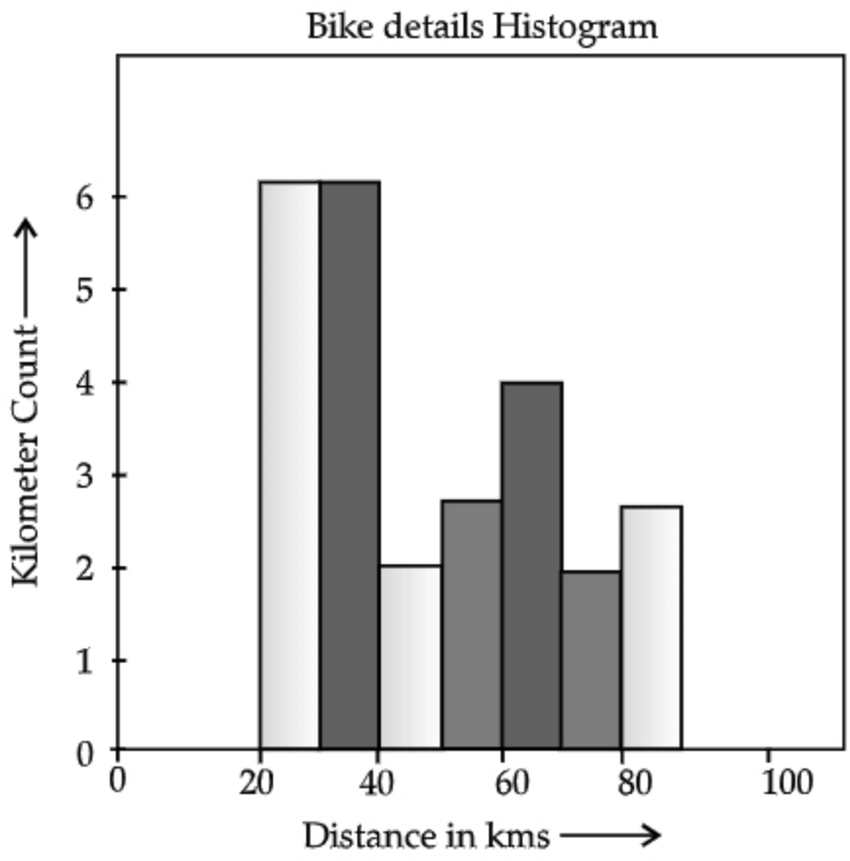
Bar Chart

➢ **Plotting Histogram**

A histogram is an accurate representation of the distribution of numerical data. It uses rectangle to represent data. Histograms are used to show a distribution. A probability distribution can be estimated using a histogram plot.

```
import matplotlib.pyplot as plt
days = [50,80,70,80,40,20,20,20,70,20,60,20,80,50,40,50,20,60,60,60]
bins = [0,10,20,40,50,60,70,80,90,100]
plt.hist(days, bins, histtype='stepfilled', rwidth=0.88)
plt.xlabel('Distance in kms')
plt.ylabel('kilometer count')
plt.title('bike details Histogram')
```

Output



Scan to know more about this topic

Histogram

➢ **Customizing Plots**

You can customise the charts or graphs with proper details. The graph or plot should have a proper title, labels, legends etc.

- **Adding a tittle :** To add a tittle in chart or graph title () function is used.

  Syntax

  <matplotlib.pyplot>.title(tittle_string)

- **Adding Labels :** To set the labels for X-axis and Y-axis, xlable() and ylabel() are used respectively.
- **Adding Legends :** When we plot multiple ranges on a single plot, it becomes necessary that legends are specified. To add legend to the plot, legend( ) function is used.

  Syntax

  <matplotlib.pyplot>.legend(loc = <string or position no>)

Know the Terms

➢ **Scatter plot :** It is a type of plot that shows the data as a collection of points.

➢ **Pyplot :** It is a collection of methods within matplotlib library which allows user to construct 2D plots easily and interactively.

➢ **MATLAB :** It is a high performance language for technical computing. It integrates computation, visualization, and programming in an easy to use environment where problems and solutions are expressed in familiar mathematical notations.

➢ **Pie-chats :** The chart is shaped in a circular form like a pie and each data point is represented by a certain percentage while taking a part of the pie that is shaped like a slice.

➢ **Title :** This is the text that appears on the top of the plot. It defines what the chart is about. The legend of a graph reflects the data displayed in the graph's Y-axis, also called the graph series.

STAND ALONE MCQs (1 Mark each)

Q. 1. The command used to give a heading to a graph is .....

(A) plt.show() **(B)** plt.plot()

(C) plt.xlabel() **(D)** pit.title()

[CBSE SQP 2020-21]

Ans. Option (D) is correct.

> ***Explanation :*** plt.title() can be used to display the title of a plot.

Q. 2. Using Python Matplotlib ..... can be used to count how many values fall into each interval.

(A) lineplot

(B) bargarph

(C) histogram **[CBSE SQP 2020-21]**

Ans. Option (C) is correct.

> ***Explanation :*** A Histogram visualizes the distribution of data over a continuous interval or certain time period.

Q. 3. Which command is used to show a chart;

(A) chartshow() **(B)** show()

(C) display() **(D)** showchart()

Ans. Option (B) is correct.

> ***Explanation :*** plt.show() is used to display the figure, where plt is an alias.

Q. 4. The command used to show legends is ..... .

(A) display() **(B)** show()

(C) legend() (d) legends()

Ans. Option (C) is correct.

> ***Explanation :*** In the matplotlib library, there's a function called legend() which is used to Place a legend on the axes. The attribute Loc in legend() is used to specify the location of the legend.

Q. 5. Which of the following is not a valid chart type?

(A) lineplot

(B) bargraph

(C) histogram

(D) statistical

Ans. Option (D) is correct.

> ***Explanation :*** Python provides different types of plots such as Bar Graph, Histogram, Scatterplot, Area plot, Pie plot for viewing the data.

Q. 6. The command used to save a plotted graph using pyplot functions is ..... .

(A) plt.save() **(B)** plt.savefig()

(C) plt.savepicture() **(D)** plt.saveimage()

Ans. Option (B) is correct.

> ***Explanation :*** The figure created can be saved to our local machines by using save fig() method.

Q. 7. The command used to display the title for x-axis to a graph is ..... .

(A) plt.xtitle() **(B)** plt.xaxis()

(C) plt.xlabel() **(D)** plt.saxistitle()

Ans. Option (C) is correct.

> ***Explanation :*** plt.xlabel() and plt.ylabel() are used to set the x and y label of the plot.

Q. 8. The function used to give title to a graph is ..... .

(A) plt.show() **(B)** plt.plot()

(C) plt.title() **(D)** plt.title()

Ans. Option (C) is correct.

> ***Explanation :*** The title() method in matplotlib module is used to specify title of the visualization depicted and displays the title using various attributes.

Q. 9. Which of the following is not a valid plotting function of 'pyplot'?

(A) bar() **(B)** hist()

(C) histh() **(D)** barh()

Ans. Option (C) is correct.

> ***Explanation :*** matplotlib.pyplot is a collection of functions that make matplotlib work like MATLAB. Each pyplot function makes some change to a figure: e.g., creates a figure, creates a plotting area in a figure, plots some lines in a plotting area, decorates the plot with labels, etc.

Q. 10. Point out the correct combination with regards to kind keyword for graph plotting.

(A) 'hist' for histogram **(B)** 'box' for boxplot

(C) 'area' for area plots **(D)** all of the mentioned

Ans.Option (D) is correct.

> ***Explanation :*** The kind keyword argument of plot() accepts a handful of values for plots other than the default Line plot.

ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions a statement of Assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(A) Both Assertion **(A)** and reason (R) are true and reason (R) is the correct explanation of Assertion **(A)**.

(B) Both Assertion **(A)** and reason (R) are true but reason (R) is not the correct explanation of Assertion **(A)**.

(C) Assertion **(A)** is true but reason (R) is false.

(D) Assertion **(A)** is false but reason (R) is true.

Q. 1. Assertion (A) : Pandas offer a single and convenient place to plot graphs i.e. matplotlib for visualization and data analysis through graphs.

Reason (R) : Matplotlib is a 2-D plotting library that helps in visualizing figures.

Ans. Option (A) is correct.

> *Explanation :* Data visualisation means graphical or pictorial representation of the data using graph, chart,etc.
> Matplotlib library is used for creating static, animated,and interactive 2D- plots or figures in Python.

Q. 2. Assertion (A) : A line plot is a graph that shows the frequency of data along a number line.

Reason (R) : The legend is displayed by default associating the colours with the plotted data.

Ans. Option (B) is correct.

> *Explanation :* A line plot is used to visualise growth or decline in data over a time interval.

Q. 3. Assertion (A) : We cannot control the edge color of the bar, line style and line width.

Reason (R) : To make a histogram, the data is sorted into"bins" and the number of data points in each bin is counted.

Ans. Option (D) is correct.

> *Explanation :* Categorical data can be represented in rectangular blocks with different heights or lengths proportional to the values. Such a type or representation is called a bar chart.
> Histograms are column-charts, where each column represents a range of values, and the height of a column corresponds to how many values are in that range.

Q. 4. Assertion (A) : Pie is a type of graph in which a circle is divided into different sectors and each sector represents a part of the whole.

Reason (R) : The default False means each hist will be filled with colour and True means each hist will be empty.

Ans. Option (C) is correct.

> *Explanation :* A pie plot is used to represent numerical data proportionally.
> The default True means each hist will be filled with colour and False means each hist will be empty.

Q. 5. Assertion (A) : Scatter plots are sometimes called correlation plots

Reason (R) : Scatter plots show how two variables are correlated.

Ans. Option (A) is correct.

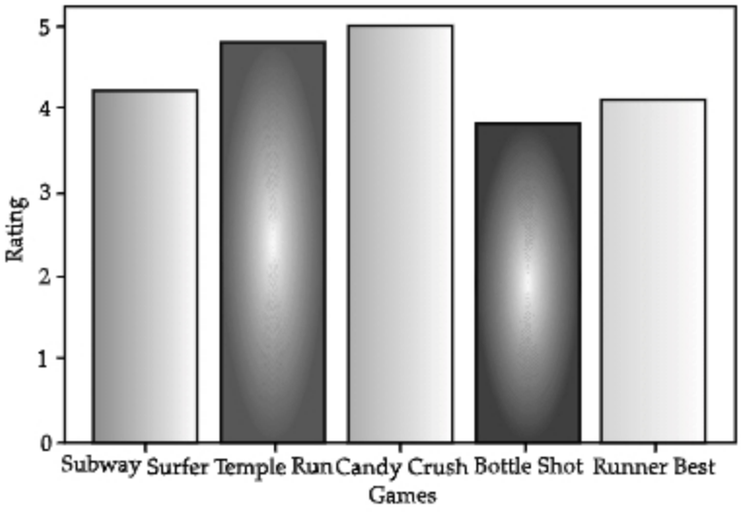
> *Explanation :* A scatter chart is a two-dimensional data visualisation method that uses dots to represent the values obtained for two different variables —one plotted along the x-axis and the other plotted along the y-axis.

CASE-BASED MCQs

Attempt any four sub-parts from each question. Each sub-part carries 1 mark.

I. Read the following text and answer the following questions on the basis of the same :

Q. 1. Mr. Sharma is working in a game development industry and he was comparing the given chart on the basis of the rating of the various games available on the play store.



He is trying to write a code to plot the graph. Help Mr. Sharma to fill in the blanks of the code and get the desired output.

```
import _____                    #Statement 1
Games=["Subway  Surfer", "Temle Run", "Canddy Crush",  "Bottle Best"]
Rating=[4.2, 4.8, 5.0, 3.8, 4.1]
plt.____  (Games, Rating) #Statement 2
plt.xlabel("Games")
plt.____  ("Rating")          #Statement 3
plt.____                      #Statement 4
```

Q. 1. Choose the right code from the following for statement 1.

(A) matplotlib as plt **(B)** pyplot as plt

(C) matplotlib.pylot as plt

(D) matplotlib.plt as pyplot

Ans. Option (C) is correct.

> ***Explanation :*** matplotlib.pyplot is a state-based interface to matplotlib. It provides a MATLAB-like way of plotting.

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

(A) line () **(B)** bar ()

(C) hist () **(D)** barh ()

Ans. Option (B) is correct.

> ***Explanation :*** A bar chart or bar graph is a chart or graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent.

Q. 3. Choose the correct option for the statement 3.

(A) title("Rating")

(B) ytitle("Rating")

(C) ylabel("Rating")

(D) yaxis("Rating")

Ans. Option (C) is correct.

> ***Explanation :*** The ylabel() function in pyplot module of matplotlib library is used to set the label for the x-axis.

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

(A) display () **(B)** print ()

(C) bar () **(D)** show ()

Ans. Option (D) is correct.

> ***Explanation :*** The show() function in pyplot module of matplotlib library is used to display all figures.

Q. 5. In case Mr. Sharma wants to change the above plot to the any other shape, which statement, should be change.

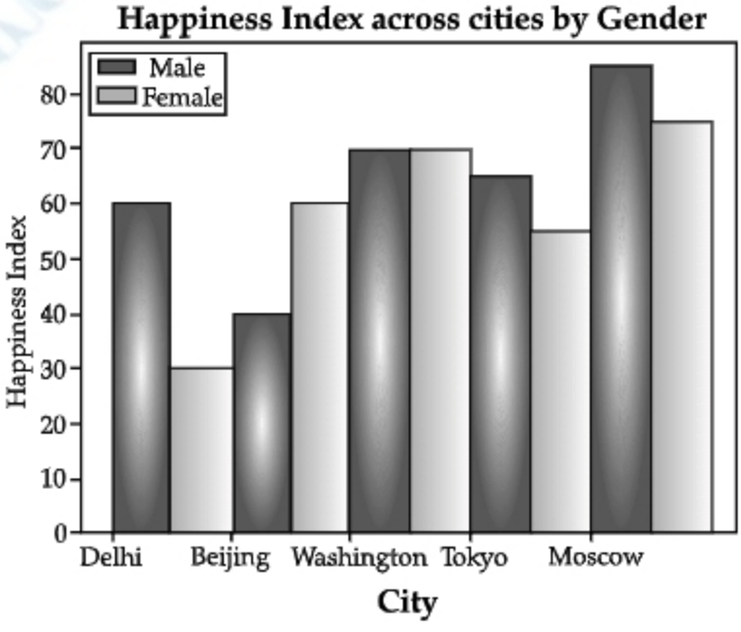
(A) Statement 1 **(B)** Statement 2

(C) Statement 3 **(D)** Statement 4

Ans. Option (B) is correct.

II. Gaurav has written a Python Code to create a bar plot as given below using the following data :

City	Happiness_ Index Male	Happiness_ Index Female
Delhi	60	30
Beijing	40	60
Washington	70	70
Tokyo	65	55
Moscow	85	75




```
import___as____                    #Statement 1
City=['Delhi',  'Beijing',  'Washington',  'Tokyo',
'Moskow']
Gender=['Male',  'Female']  Happiness_Index_
Male= [60, 40, 70, 65, 85]
Happiness_Index_Female = [30, 60, 70, 55, 75]
plt.bar[[0.25,1.25,2.25, 3.25,4.25], Happiness_Index_
Female, color='Greeb',
width =.5, label = "Female")       #Statement 2
pos"range (len (city)) print (pos)
```

```
pos=xticks (pos, city, fontsize==10) plt.xlabel ('city'. fontsize=16)
plt.ylabel (Happiness_Index', fontsize=16)
_____ #Statement 3
_____ #Statement 4
_____ #Statement 5
```

Q. 1. Identify the suitable code to be used in the blank space in line marked as Statement 1.

(A) matplotlib as plt **(B)** numpy as np
(C) pandas as pd
(D) matplotlib.pyplot as plt

Ans. Option (D) is correct.

> ***Explanation :*** matplotlib.pyplot is a state-based interface to matplotlib. It provides a MATLAB-like way of plotting.

Q. 2. What is the name of the function to plot the required bar graph in the line marked as Statement 2.

(A) hist () **(B)** pie ()
(C) bar () **(D)** scatter ()

Ans. Option (C) is correct.

> ***Explanation :*** A bar chart or bar graph is a chart or graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent.

Q. 3. Fill in the blank in statement 3 to set Chart Title as "Happiness Index across cities by gender "an font size as 18.

(A) plt.xtitle ("Happiness Index across cities by gender", fontsize=18)
(B) plt.title ("Happiness Index across cities by gender", fontsize=18)
(C) plt.ytitle ("Happiness Index across cities by gender", fontsize=18)
(D) plt.show ("Happiness Index across cities by gender", fontsize=18)

Ans. Option (B) is correct.

> ***Explanation :*** The title() method in matplotlib module is used to specify title of the visualization depicted and displays the title using various attributes.

Q. 4. Identify the suitable code for line marked as Statement 4 to display the legends as shown in the plot.

(A) plt.showlegend ()
(B) plt.legend ()
(C) plt.display ()
(D) plt.show ()

Ans. Option (B) is correct.

> ***Explanation :*** A legend is an area describing the elements of the graph. In the matplotlib library, there's a function called legend() which is used to Place a legend on the axes.

Q. 5. Fill in the blank marked in Statement 5 to display the plot.

(A) plt.plot () **(B)** plt.showplot ()
(C) plt.display () **(D)** plt.show ()

Ans. Option (D) is correct.

> ***Explanation :*** The show() function in pyplot module of matplotlib library is used to display all figures.

III. A Shivalik restaurant has recorded the following data into their register for their income by Drinks and Food.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Drinks	450	560	400	605	580
Food	490	600	425	610	625

A software designer is trying to write a code to plot the graph. Help him to fill in the blanks of the code and get the desired output.

```
importmatplotlib.pyplot as pp
day =['Monday','Tuesday','Wednesday','Thursday','Friday']
dr = [450,560,400,605,580]
fd = [490,600,425,610,625]
pp.plot(day,dr,label='Drinks',_____= 'g' ,_____ ='dotted',marker='+')   Line-1
pp.plot(day,fd,label='Food',_____='m',_____='dashdot',marker='x')       Line-2
pp._____                                                                Line-3
pp.xlabel("Days")
pp._____ ("Orders")                                                     Line-4
pp._____                                                                Line-5
pp.show()
```

Q. 1. Identify the suitable code to be used in the blank space in line marked as Line-3 to write a title for the chart "The Weekly Restaurant Orders".

(A) pp.title(The Weekly Restaurant Orders)

(B) pp.title("The Weekly Restaurant Orders")

(C) pp.xtitle("The Weekly Restaurant Orders")

(D) pp.ytitle(The Weekly Restaurant Orders)

Ans. Option (B) is correct.

> ***Explanation :*** The title() method in matplotlib module is used to specify title of the visualization depicted and displays the title using various attributes.

Q. 2. What is the name of the function to Display legends in line marked as Line-5?

(A) show() **(B) showlegend()**

(C) legend() **(D) display**

Ans. Option (C) is correct.

> ***Explanation :*** A legend is an area describing the elements of the graph. In the matplotlib library, there's a function called legend() which is used to Place a legend on the axes.

Q. 3. What is the name of the attribute to display your choice of colours for both the lines drinks and food in line marked as Line-1 and 2?

(A) colour **(B)** style

(C) xcolour **(D)** ycolour

Ans. Option (A) is correct.

> ***Explanation :*** Matplotlib.pyplot.colours(). This function is used to specify the color.

Q. 4. Identify the suitable attribute to use the line style – dotted for drinks and dashdot for food in line marked as Line-1 and 2?

(A) style **(B)** size

(C) bar **(D)** linestyle

Ans. Option (D) is correct.

> ***Explanation :*** Simple linestyles can be defined using the strings "solid", "dotted", "dashed" or "dashdot".

Q. 5. Choose the correct option for the Line-4.

(A) title("Orders") **(B)** ytitle("Orders")

(C) ylabel("Orders") **(D)** yaxis("Orders")

Ans. Option (C) is correct.

❐❐❐

OSWAAL BOOKS LEARNING MADE SIMPLE

CHAPTER 3

SOCIETAL IMPACTS

Syllabus

- *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.*

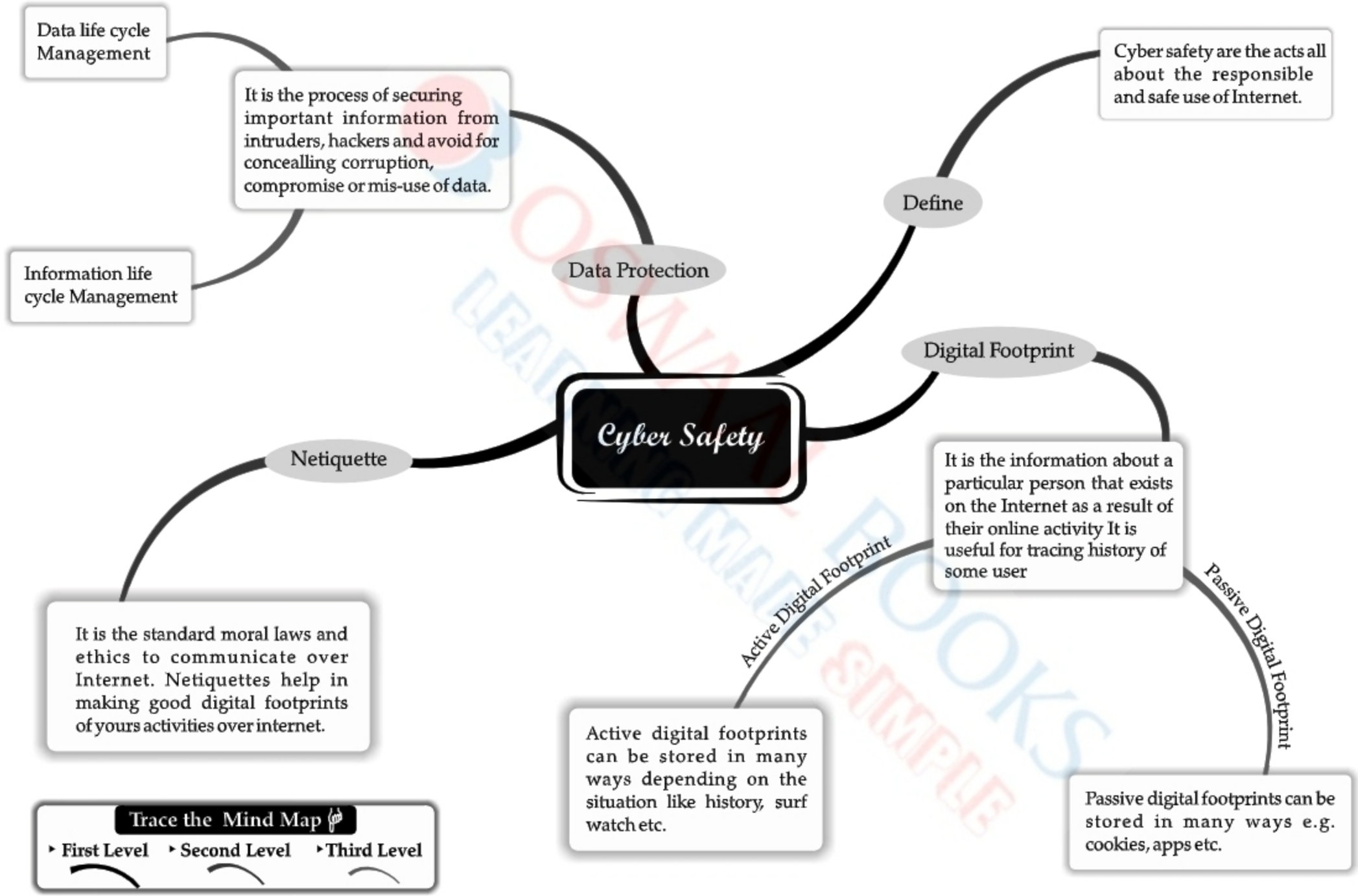
Revision Notes

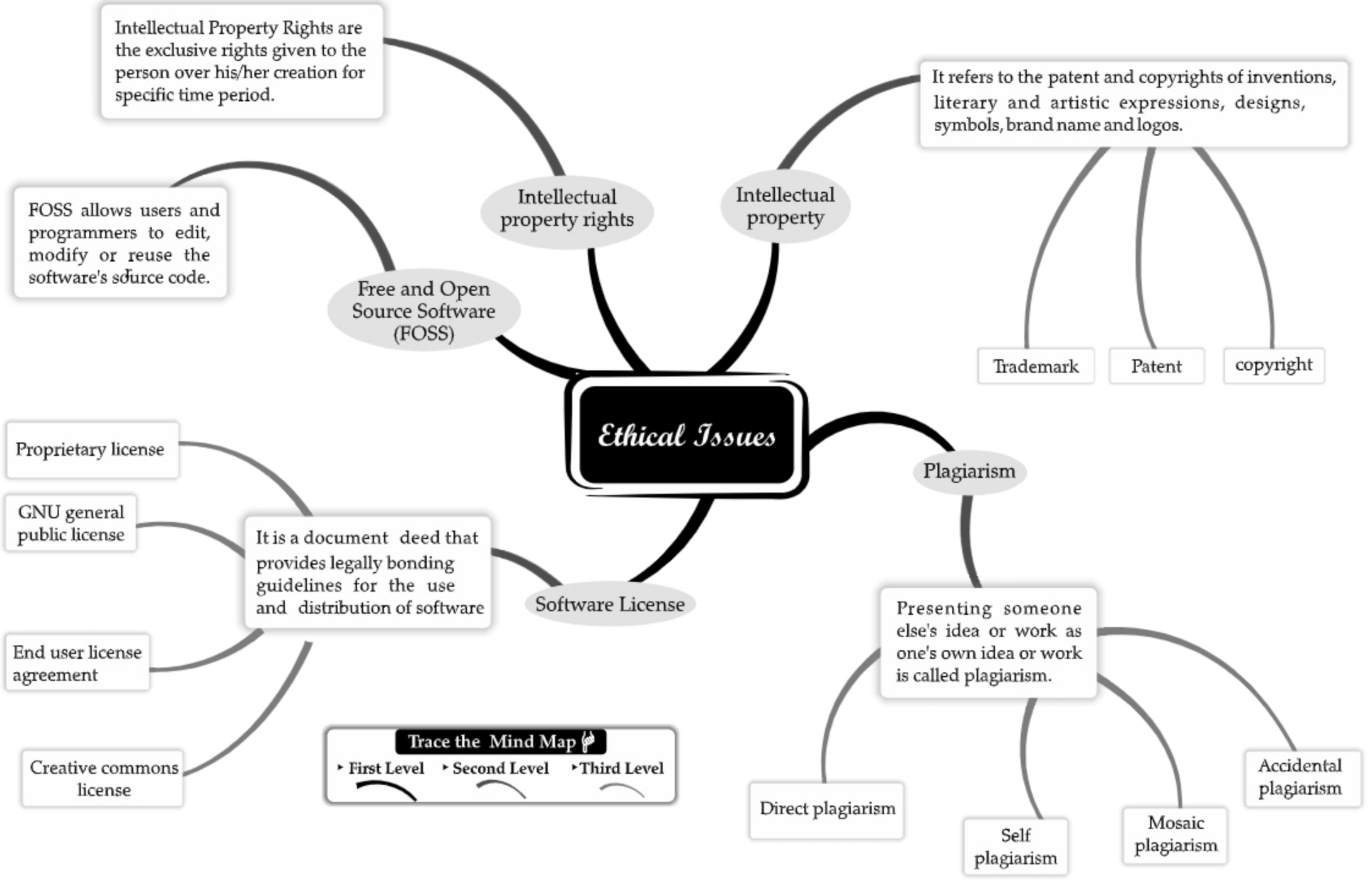
Cyber Safety

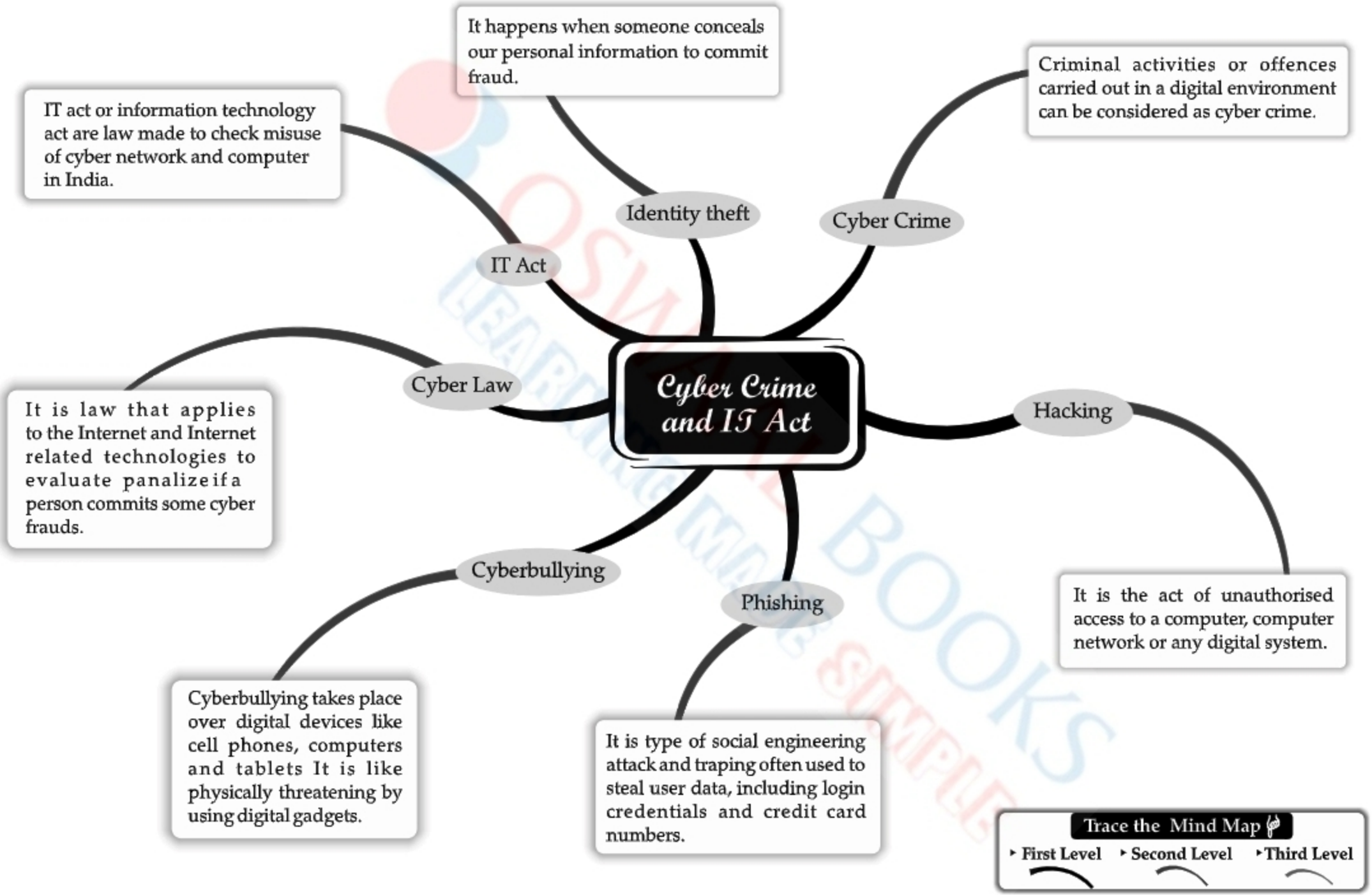
- Cyber safety is the act all about the responsible and safe use of Internet services by dealing with the risk which is associated using the Internet. This behaviour helps us to protect our personal information and minimize the danger online.
- When we use Internet we need to be careful about sharing our personal information. Share your personal information only with the trustworthy sources. If someone succeeds in stealing your personal information it could create great danger.
- **Digital Footprint**
  - Whatever a person be on internet creates his usage or we can say left a shadow behind of that activity and all these activities shadow creates your identity, this identity is called digital footprint.
    Digital footprint is nothing but the record of what a person do online.
  - Digital footprint includes e-mail you sent, information you shared, websites you visited and the activities you took part online.
  - Digital footprint is used for several reason for example marketers use your digital footprint to find out what kind of product you have interested and a interviewer what kind of activities the candidates perform online, it gives better idea about the candidate's personality.
    Digital footprint is of two types :
    1. **Active Digital Footprint :** When a user knowingly share the personal data in order to share information about the user by means of social networking digital platform.

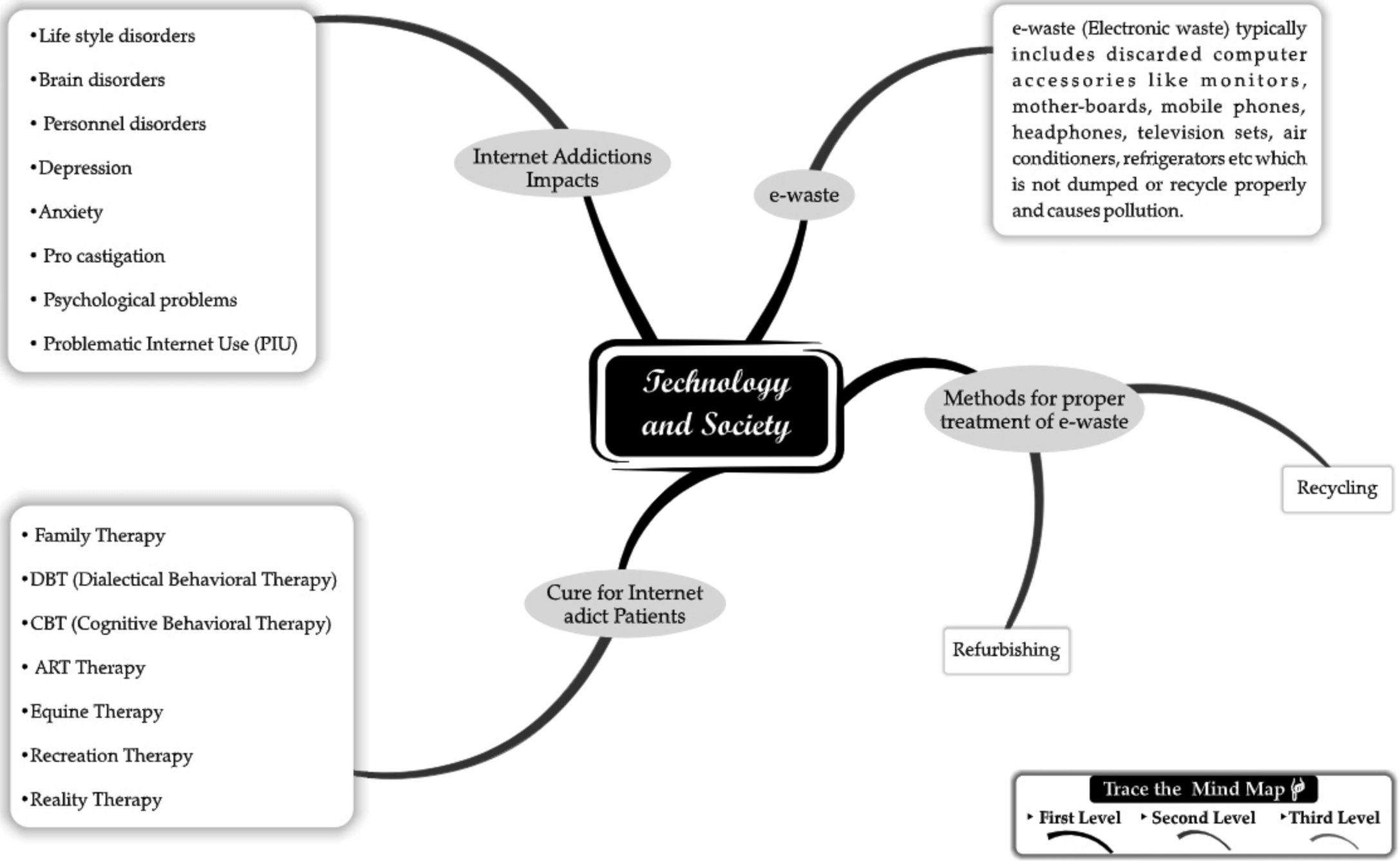
       e.g. when user makes a comment or post something on social media.
    2. **Passive Digital Footprint :** When the personal data of the user in collected without letting him know or collection of personal data of user without the permission of him is known as passive digital footprint.

       e.g. when user visits any website traces his physical location using user's device IP address.


Cyber Safety
Data Protection
Data life cycle Management
It is the process of securing important information from intruders, hackers and avoid for concealling corruption, compromise or mis-use of data.
Information life cycle Management
Define
Cyber safety are the acts all about the responsible and safe use of Internet.
Digital Footprint
It is the information about a particular person that exists on the Internet as a result of their online activity It is useful for tracing history of some user
Active Digital Footprint
Active digital footprints can be stored in many ways depending on the situation like history, surf watch etc.
Passive Digital Footprint
Passive digital footprints can be stored in many ways e.g. cookies, apps etc.
Netiquette
It is the standard moral laws and ethics to communicate over Internet. Netiquettes help in making good digital footprints of yours activities over internet.
Trace the Mind Map
First Level
Second Level
Third Level


Ethical Issues
Intellectual property rights
Intellectual Property Rights are the exclusive rights given to the person over his/her creation for specific time period.
Free and Open Source Software (FOSS)
FOSS allows users and programmers to edit, modify or reuse the software's source code.
Intellectual property
It refers to the patent and copyrights of inventions, literary and artistic expressions, designs, symbols, brand name and logos.
Trademark
Patent
copyright
Software License
It is a document deed that provides legally bonding guidelines for the use and distribution of software
Proprietary license
GNU general public license
End user license agreement
Creative commons license
Plagiarism
Presenting someone else's idea or work as one's own idea or work is called plagiarism.
Direct plagiarism
Self plagiarism
Mosaic plagiarism
Accidental plagiarism
Trace the Mind Map
First Level
Second Level
Third Level


Cyber Crime and IT Act
IT Act
IT act or information technology act are law made to check misuse of cyber network and computer in India.
Identity theft
It happens when someone conceals our personal information to commit fraud.
Cyber Crime
Criminal activities or offences carried out in a digital environment can be considered as cyber crime.
Cyber Law
It is law that applies to the Internet and Internet related technologies to evaluate panalizeifa person commits some cyber frauds.
Hacking
It is the act of unauthorised access to a computer, computer network or any digital system.
Cyberbullying
Cyberbullying takes place over digital devices like cell phones, computers and tablets It is like physically threatening by using digital gadgets.
Phishing
It is type of social engineering attack and traping often used to steal user data, including login credentials and credit card numbers.
Trace the Mind Map
First Level
Second Level
Third Level


Technology and Society
Internet Addictions Impacts
•Life style disorders
•Brain disorders
• Personnel disorders
•Depression
•Anxiety
• Pro castigation
• Psychological problems
• Problematic Internet Use (PIU)
e-waste
e-waste (Electronic waste) typically includes discarded computer accessories like monitors, mother-boards, mobile phones, headphones, television sets, air conditioners, refrigerators etc which is not dumped or recycle properly and causes pollution.
Methods for proper treatment of e-waste
Recycling
Refurbishing
Cure for Internet adict Patients
• Family Therapy
•DBT (Dialectical Behavioral Therapy)
•CBT (Cognitive Behavioral Therapy)
• ART Therapy
•Equine Therapy
•Recreation Therapy
•Reality Therapy
Trace the Mind Map
First Level
Second Level
Third Level

➢ **How can you make your digital footprint positive?**

You can make your digital footprint positive by being little careful when you are surfing. You can do following things:

- Always check the content you post on web. If you are not careful about what you do online then there is the possibility of your negative digital footprint.
- Don't keep the attitude that you can do anything online and no one will come to know. This information can be fetched even without your permission. All the information stored in the form of cookies which can be accessed by the one who wants to get information about your digital footprint.
- You should always know what you exactly want because the confusion can create wrong footprint and can mislead the one who is looking for your digital footprint.

➢ **Advantage of digital footprint :**

Although when we hear the name digital footprint a negative image comes in our mind because it keeps the record of each and every activity of us, we do online. But digital footprint has so many advantages.

- Digital footprint makes our online experience friendly. Digital footprint decreases the complexity of the online world. Without digital footprint, our net surfing may not be easy as it is today.
- Digital footprint helps Google Ad Sense to serve as best. Using our digital footprint, Google Ad Sense provides us appropriate advertisement. If they haven't used our digital footprint this may happen that we are searching for job information and they feeding our search with railway booking information.
- These days most of the devices are GPS enabled which digital footprint, online maps provides you best root possible.

➢ **Net and communication etiquettes (Netiquettes)**

Scan to know more about this topic

Netiquette

- Netiquette is a way to communicate over Internet. In real world, we use a manner to talk so that the exact meaning could successfully convey to the listener. On Internet, this manner is known as Netiquettes which help the user to get exact idea of what is said.
- Netiquettes makes the communication process successful because without it sender's message can be misinterpreted by the receiver though he will not be able to see the facial expression of the sender.
- Netiquettes makes the communication more effective by adding human emotion to it. By using netiquettes, sender can express what he was feeling while writing the post or message.
- Netiquettes help the user in establishing good relation with the other users because when use netiquettes he can express what he feels or what he wants to say.
- Netiquettes ensure careful word formation and also placing them at right place. These also ensure the correct use of emotions.
- Netiquettes help in making good digital footprint of yours. If you are applying netiquettes while taking to friends or other person then you are making good reputation of yourself.

Rules to follow for good netiquette are :

(i) Don't send same message again and again, it creates negative effect and irritate other people, no matter how good this message is.

(ii) Always take permission of other person before sharing their personal information, photos etc. If you don't take permission before sharing the information, it is bad netiquette.

(iii) Never make bad comments about anyone on social media, it will degrade your reputation and don't catch into fight on social media even try to avoid such situation.

(iv) Never post abusive content on social media, it will create difficulty for you. Even your account can be terminated.

Do's	Don'ts
Keep messages and posts brief.	Post inflammatory/offensive comments.
Reread your posts or emails to make sure they say what you intend.	Write in ALL CAPS. It is considered as SHOUTING on the net.
Remember that you leave a digital footprint. So, be careful what you write.	Respond to internet trollers/personal attacks.
Use discretion.	Post private or embarrassing images/comments.
Include a subject line in an email.	Use sarcasm. It might be misinterpreted.
Protect personal information.	Violet copyright laws, Make sure your work is your own or properly cited.
Obey copyright laws.	Exclude people or talk behind their backs.
Stay focused and stick to the topic.	Spam others by sending large number of unsolicited e-mails.

➢ **e-mail Etiquettes**

- Write a clear, concise subject line that reflects the body of the e-mail. Avoid subject lines with general works like, "Hi", "Hello" and do not leave the subject line blank.
- Always use an appropriate greeting. Begin your e-mail with phrases such as Good Morning, Good Afternoon etc.
- Be aware that funny sayings or colloquialisms may be completely misconstrued by your colleagues in overseas offices.
- Always state if your e-mail needs an action and by when. Open-ended e-mails can be confusing. Having an action or even letting the recipient know that no further action is required is helpful.
- Don't hit reply all. It can be annoying to be copied into every email or to see every response in a chain if it is not relevant to your recipient.
- Never use inappropriate language in an e-mail. The reality is that your e-mail will remain on the server long after you have deleted it.

➢ **Data protection**

- It is the process of safeguarding important information from corruption, compromise or loss. In short, you should be able to decide whether or not you want to share some information, who has access to it, for how long, for what reason and be able to modify some of this information and more.
- A large part of a data protection strategy is ensuring that data can be restored quickly after any corruption or loss. Protecting data from compromise and ensuring data privacy are other key components of data protection. There are two key areas of data management used in data protection as.

  (i) **Data life cycle management** is the process of automating the movement of critical data to online and offline storage.

  (ii) **Information life cycle management** is a comprehensive strategy for valuing, cataloguing and protecting information assets from application and user errors, malware and virus attacks, machine failure or facility outage and disruptions.

Purpose of data protection

Storage technologies that can be used to protect data include a disk or tape backup that copies designated information to a disk based storage array or a tape cartridge device so it can be safely stored. Mirroring can be used to create an exact replica of a website or files so they are available from more then one place. Storage snapshots can automatically generate a set of pictures to information stored on tape or disk, enabling faster data recovery while continuous data protection backs up all the data in an enterprise whenever a change is made.

Know the terms

➢ Cybersafety addresses the ability to act in a safe and responsible manner on the Internet and other connected environments.

➢ Digital footprint is data that is left behind when users have been online.

- Digital Tattoos: Digital footprints are also termed as Digital Tattoos.
- Netiquette is the short form of "internet etiquette" or communication etiquettes over the internet

Ethical Issues

- Intellectual Property

Scan to know more about this topic

Intellectual property

  - When someone owns a house or a motorcycle, we say that the person owns that property. Similarly, if someone comes out with a new idea, this original idea is that person's intellectual property.
  - Intellectual property refers to the inventions, literary and artistic expressions, designs and symbols, names and logos. The ownership of such concepts lies with the creator or the holder of the intellectual property.
  - This enables the creator or copyright owner to earn recognition or financial benefit by using their creations or inventions.
    Intellectual property is legally protected through copyright patents, trademarks etc.

    (i) **Copyright :** It grants legal rights to creators for their original works like writing, photograph, audio recordings, video, sculptures, architectural works, computer software, and other creative works like literary and artistic work.

    Copyrights are automatically granted to creators and authors. Copyright law gives the copyright holder a set of rights, that they alone can avail legally. The rights include right to copy (reproduce) a work, right to create derivative works based upon it, right to distribute copies of the work to the public and right to publicly display or perform the work. It prevents others from copying, using or selling the work. For example, any writer holds the copyright to his book. It would be an infringement of the writer's copyright if someone used parts of his book without permission. To use other's copyrighted material, one needs to obtain a license from them.

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

    Patent gives full control to the patentee to decide whether or how the invention can be used by others. Thus it encourages inventors to share their scientific or technological findings with others. A patent protects an invention for 20 years, after which it can be freely used. Recognition and financial benefits right the environment and provide motivation for more creativity and innovation.

    (iii) **Trademark :** It includes any visual symbol, word, name, design, slogan, label etc., that distinguishes the brand or commercial enterprise, from other brands or commercial enterprise.

    For example, no company other than ABC can use the ABC brand to sell shoes or clothes. It also prevents others from using a confusingly similar mark, including works or phrases.

- **Intellectual Property Rights (IPR)**

Intellectual Property Rights are the exclusive rights given to the person over his/her creation for specific time period. These rights allow the patents or owner to buy, sell, exchange their licensed goods to different people or organisations. Intellectual property rights are largely covered by laws governing to patents. Copyrights, industrial design rights, trademarks, plant variety rights, trade dress, geographical indications, circuit design rights and supplementary protection certificates for pharmaceutical products and database rights etc.

- **Objectives of IPR**

The policy is a comprehensive document that lays down seven objectives which have been elaborated with actionable steps to be undertaken by the identified nodal ministry or department towards achieving objectives.

(i) **IPR Awareness : Outreach and Promotion** — To create public awareness about the economic, social and cultural benefits of IPRs among all sections of society.

(ii) **Generation of IPRs :** To stimulate the generation of IPRs.

(iii) **Legal and Legislative Framework :** To have strong and effective IPR laws, which balance the interests of owners rights with larger public interest.

(iv) **Administration and Management :** To modernize and strengthen service oriented IPR administration.

(v) **Commercialization of IPRs :** Get value for IPRs through commercialization.

(vi) **Enforcement and Adjudication** : To strengthen the enforcement and adjudicatory mechanisms for combating IPR infringements.

(viii) **Human Capital Development :** To strengthen and expand human resources, institutions and capacities for teaching, training, research and skill building in IPRs.

- Intellectual Property laws and enforcement vary widely from jurisdiction to jurisdiction. Term 'open source' governmental efforts to harmonize them through international treaties such as 1994 World Trade Organisation (WTO) Agreement on Trade Related aspects of Intellectual Property Rights (TRIPs), while other treaties may facilitate registration in more than one jurisdiction at a time.
- With companies, institutions and individuals constantly forging ahead in newer fields and geographical territories and with path breaking inventions becoming the norm, the field of Intellectual Property rights has assumed primordial importance, especially in emerging economics like India.
- **Violation of IPR**

Violation of IPR may happen in one of the following ways :

1. **Plagiarism :** With the availability of Internet, we can instantly copy or share text, pictures and videos. Presenting someone else's idea or works as one's own idea or work is called plagiarism. If we copy some contents from Internet, but do not mention the source or the original creator, then it is considered as an act of plagiarism. Further, if someone derives an idea or a product from an already existing idea or product, but instead presents it as a new idea then also it is plagiarism. It is a serious ethical offense and sometimes considered as an act of fraud. Even if we take contents that are open for public use, we should cite the author or sources to avoid plagiarism.

   Types of Plagiarism :

   (i) **Direct Plagiarism** is the word to word transcription of a section of someone else work without attribution and without quotation marks.

   (ii) **Self Plagiarism** occurs when a student submits his or her own previous work or mixes parts of previous work without permission from all professors involved.

   (iii) **Mosaic Plagiarism** occurs when a student borrows phrases from a source without using quotation marks.

   (iv) **Accidental Plagiarism** occurs when a person neglects to cite their sources or misquotes their sources.

   Apart from these, other categories of plagiarism are as follows :

   - **CLONE :** Cloning is the most problematic and common form of plagiarism.
   - **Ctrl + C :** In this type of plagiarism, a particular portion of the text is copied from a single source without any alteration.
   - **FIND-REPLACE :** Most common keywords of the copied content are changed.
   - **REMIX :** Information from various sources are collected and mixed.

2. **Copyright Infringement :** Copyright infringement is when we use other person's work without obtaining their permission to use or we have not paid for it, if it is being sold. Suppose we download an image from the Internet and use it in our project. But if the owner of the copyright of the image does not permit its free usage, then using such image even after giving reference of the image in our project is a violation of copyright. Just because it is on the Internet, does not mean that it is free for use. Hence, check the copyright status of writer's work before using it to avoid plagiarism.

3. **Trademark Infringement :** Trademark infringement means unauthorised use of other's trademark on products and services. An owner of a trademark may commence legal proceedings against someone who infringes its registered trademark.

- **Software License**

It is a document that provides legally binding guidelines for the use and distribution of software. Software licenses typically provide end users with the right to one or more copies of the software without violating copyrights.

Types of Software License :

(i) Proprietary license is a license where the copyright stays with the produces and the user is granted the right to use the software.

(ii) GNU General Public License (GPL) which are agreements under which open source are usually licensed.

(iii) End User License Agreement (EULA) indicates the terms under which the end user may use the software.

(iv) Creative commons (CC) license is a public copyright license that enables free distribution of a copyrighted work.

Apache is the most popular web server software that enables a computer to host one or more websites. It is open source and free to use hence enabling web hosting companies to offer web hosting solutions at minimal costs.

- **Platforms supported by Apache** : Linux, Windows and Macintosh operating systems.
- Apache web server software is also known as Apache HTTP server.

➢ **Free and Open Source Software (FOSS)**

- FOSS has a large community of users and developer who are contributing continuously towards adding new features or improving the existing features.
- The term free indicates that the software does not have constraints on copyrights. The term 'open source' refers software development from expert developers collaborating worldwide without any need for reverse engineering. Free and open source software may also be referred to us Free/libre open source software (FLOSS) or free open source software (FOSS).
- One major reason for the growth and use of FOSS technology is because users have access to the source so it is much easier to fix faults and improve the applications. In combination with the open license, this simplifies the development process for many enterprises and gives them flexibility that simply is not available with the confiner of a proprietary or commercial product.
- For example, Linux Kernel based operating systems like Ubuntu and Fedora come under FOSS. Some of the popular FOSS tools are office packages, like Libre office, browser like Mozilla Firefox etc.

Know the terms

- ➢ **Plagiarism :** It means copying someone else's work and then passing it off as one's own.
- ➢ **License :** It is the permission granted by the holder of a copyright to another to use an original work.
- ➢ **OSS** : An OSS (open source software) refers to freedom to use, share and/or modify the source code and allow copyrights to other users.
- ➢ **Free and Open Source Licence :** It refers to a software that users can safely run, adapt and redistribute without legal restraint, and which emphasizes on freedom.
- ➢ **Shareware :** Shareware are copyrighted software that can be shared for a limited on a trial basis with the understanding that if the user decides to use it, he will pay for it.
- ➢ **Copyleft Licenses :** It allows modification and distribution of software with source code.

Cyber Crime and IT Act

➢**Cyber Crime**

- Criminal activities or offences carried out in a digital environment can be considered as a cyber crime. In such crimes, either the computer itself is the target or the computer is used as a tool to commit a crime.
- Cyber crimes are carried out against either an individual or a group or an organisation or even against a country, with the intent to directly or indirectly cause physical harm, financial loss or mental harassment. A cyber criminal attacks a computer or a network to

Scan to know more about this topic



Cyber crime

- Apart from this, a cyber criminal may spread viruses and other malwares in order to steal private and confidential data for blackmailing and extortion. A Computer virus is a type of malicious code that can copy itself and can have detrimental effect on the computers, by destroying data or corrupting the system.
- Similarly, malware is a software designed to specifically again unauthorised access to computer systems. The nature of criminal activities are alarmingly increasing day by day, with frequent reports of hacking, ransomware attacks, denial of services, phishing, e-mail fraud, banking fraud and identity theft.

1. Hacking

Hacking is the act of unauthorised access to a computer, computer network or any digital system. Hackers usually have technical expertise of the hardware and software.

They look for bugs to exploit and break into the system.

Hacking, when done with a positive intent is called ethical hacking. Such ethical hackers are known as white hat hackers. They are specialists in exploring any vulnerability or loophole during testing of the software. Thus, they help in improving the security of a software. An ethical hacker may exploit a website in order to discover its security loopholes or vulnerabilities. He then reports his findings to the website owner. Thus, ethical hacking is actually preparing the owner against any cyber attack.

A non-ethical hacker is the one who tries to gain unauthorised access to computers or networks in order to steal sensitive data with the intent to damage or bring down systems. They are called black hat hackers, or crackers. Their primary focus in on security cracking and data stealing. They use their skills for illegal or malicious purposes. Such hackers try to break through system securities for identity theft, monetary gain, to bring a competitor or rival site down, to leak sensitive information etc.

2. Phishing and Fraud e-Mails

Phishing is an unlawful activity where fake websites or e-mails that look original or authentic are presented to the user to fraudulently collect sensitive and personal details, particularly user names, passwords, banking and credit card details. The most common phishing method is through e-mail spoofing where a fake or forged e-mail address is used and the user presumes it to be from an authentic source. So you might get an e-mail from an address that looks similar to your bank or educational institution, asking for your information, but if you look carefully you will see their URL address is fake. They will often use logos of the original website, making them difficult recognise if it is real or fake. Fraud phone calls or text messages are also common these days.

(i) **Identity Theft :** Identity thieves increasingly use personal informational stolen from computers or computer networks, to commit fraud by using the data gained unlawfully. A user's identifiable personal data like demographic details, e-mail Id, banking credentials, passport, PAN, Aadhaar number and various such personal data are stolen and misused by the hacker on behalf of the victim. This is one type of phishing attack where the intention is largely for monetary gain. There can be many ways in which the criminal takes advantage of an individual's stolen identity. Given below are a few examples :

- **Financial identity theft :** When the stolen identity is used for financial gain.
- **Criminal identity theft :** Criminals use a victim's stolen identity to avoid detection of their true identity.
- **Medical identity theft :** Criminals can seek medical drugs or treatment using a stolen identity.

3. Ransomware

This is another kind of cyber crime where the attacker gains access to the computer and blocks the user from accessing, usually by encrypting the data. The attacker blackmails the victim to pay for getting access to the data or sometimes threaten to publish personal and sensitive information or photographs unless a ransom is paid.

Ransomware can get downloaded when the user visit any malicious or unsecure websites or download software from doubtful repositories. Some ransomware are sent as an e-mail attachments in spam mails. It can also reach our system when we click on a malicious advertisement on the Internet.

➢ **Combatting and Preventing Cyber Crime**

The challenges of cyber crime can be mitigated with the twin approach of being alert and taking legal help. Following points can be considered as safety measures to reduce the risk of cyber crime :

- Take regular backup of important data
- Use an antivirus software and keep it updated always
- Avoid installing pirated software. Always download software from known and secure (HTTPs) sites.
- Always update the system software which include the Internet browser and other application software.
- Do not visit or download anything from untrusted websites.
- Usually the browser alerts users about doubtful websites whose security certificate could not be verified, avoid visiting such sites.
- Use strong password for web login, and change it periodically. Do not use same password for all the websites. Use different combinations of alphanumeric characters including special characters. Ignore common words or names in password.
- While using someone else's computer, don't allow browser to save password or auto fill data and try to browse in your private browser window.
- For an unknown site, do not agree to use cookies when asked for, through a Yes/No option.
- Perform online transaction like shopping, ticketing, and other such services only through well known and secure sites.
- Always secure wireless network at home with strong password and regularly change it.

➢ **Cyber Bullying**

- Cyberbullying or bullying that takes place over digital devices like cell phones, computers and tablets. Cyberbullying can occur through SMS, text and apps or online in social media, forums or gaming where people can view, participate or share content.
- Cyberbullying includes sending, posting or sharing negative, harmful, false or mean content about someone else. It can include sharing personal or private information about someone else causing embarrassment or humiliation. Some cyberbullying crosses the line into unlawful or criminal behaviour.

The most common places where cyberbullying occurs are :

- Social media such as Facebook Instagram, Snapchat and Tik Tok (Now tiktok is are banned in India).
- Text messaging and messaging apps on mobile or tablet devices.
- Instant messaging, direct messaging and online chatting over the Internet.
- Online forums, chat rooms and message boards such as Reddit
- e-Mail
- Online gaming communities eg. MUDS (Multi-User Dungeons)

➢ **Cyber Law**

It is any law that applies to the Internet and Internet related technologies. Cyber law is one of the newest areas of the legal system. This is because Internet technology develops at such a rapid pace.

Cyber law provides legal protections to people using the Internet. This includes both businesses and everyday citizens. Understanding cyber law is of the utmost importance to anyone who uses the Internet. Cyber law has also been referred to as the "law of the Internet".

➢ **Importance of Cyber law**

- It covers all transaction over Internet.
- It keeps eyes on all activities over Internet.
- It touches every action and every reaction is cyberspace.

➢ **Evolution of Cyber law in India**

With an increase in the dependency on the use of technology, the need for cyber law was necessary. Much like every coin has two sides, therefore, the dependency on technology has its pros and cons. The rise of the 21st

century marked the evolution of cyberlaw in India with the **Information Technology Act, 2000** (popularly known as IT Act). The very first cybercrime was recorded in the year 1820.

➢ **India Information Technology Act (It Act)**

With the growth of Internet, many cases of cyber crimes, frauds, cyber attacks and cyber bullying are reported. The nature of fraudulent activities and crimes keeps changing. To deal with such menaces, many countries have come up with legal measures for protection of sensitive personal data and to safeguard the rights of Internet users.

The Parliament of India passed its first Cyber law the Information Technology (IT) Act, 2000, on the 17th October 2000, which provides the legal infrastructure for e-commerce in India. The purpose of the IT Act, 2000, as mentioned in the language of the Act is :

to provide legal recognition for transaction carried out by means of electronic data interchange and other means of electronic communication, commonly referred to as " electronic commerce", which involves the use of alternative to paper based methods of communication and storage of information, to facilitate electronic filling of document with the Government agencies and further to amend the Indian Penal Code, the Indian Evidence Act,1872, the Banker's Book Evidence Act, 1891 and The Reserve Bank of India Act, 1934 and for matters connected therewith or incidental thereto.

The General Assembly of the United Nations, by its resolution A/RES/51/162 dated 30th January 1997, adopted the Model Law on Electronic Commerce adopted by the United Nations Commission on International Trade Law. The same resolution recommends among other things that all states give favourable consideration to the Model Law when they enact or revise their law, keeping in mind the need for uniformity of law pertaining to alternatives to paper-based methods of communication and storage of information. The Indian Information Technology Act,2000, accordingly draws upon the Model Law.

The implementation of this Act has kick-started a new era of e-governance and will have a lot of impact on the way people do business in India and will also open up new opportunities for E-business as people would be less apprehensive about the legal hassles and issues not under the jurisdiction of law, *e.g.* authenticity of legal document , hacking, digital signatures and so on.

Therefore, it is essential for us to understand what the IT Act offers and what are its various perspectives.

The Government of India's Information Technology Act, 2000 amended in 2008, provides guidelines to the user for the processing, storage and transmission of sensitive information. In many Indian states, there are cyber cells in police stations where one can report any cyber crime. The act provides legal framework for electronic governance by giving recognition to electronic records and digital signatures.

➢ **Highlights of IT ACT, 2000**

For a basic understanding of the IT Act by the layman, the salient features of the Act and its relevant portion of an e-business are enumerated below:

- Electronic contracts are legally valid – EDI accorded legal recognition.
- Legal recognition according to digital signature.
- Digital signature to be affected by use of asymmetric crypto system and hash function.
- Security procedure for electronic records and digital signature.
- Appointment of Certifying Authorities (CAs) and the Controller of Certifying Authorities (CCA) including recognition of foreign Certifying Authorities.
- Controller to be appointed, who will act as repository of all digital signature certificates.
- Certifying Authorities require to get license to issue digital signature certificates.
- Various types of computer crimes defined and stringent penalties provided under the Act.
- Appointment of Adjudicating Officer for holding enquiries under the Act.
- Establishment of Cyber Appellate Tribunal under the Act.
- Appeal from order of Adjudicating Officer to Cyber Appellate Tribunal and not to any civil court.
- Appeal from order of Cyber Appellate Tribunal to High Court.
- Act to apply for offences or contraventions committed outside India.
- Network Service providers not to be liable in certain cases.

- Power to Police officers and other officers to enter into any public place and search and arrest without warrant.
- Constitution of Cyber Regulations Advisory Committee to advise the Central Government and Controller.
- Amendments effected in :

  (a) Indian Penal Code

  (b) Indian Evidence Act

  (c) Banker's Books Evidence Act

  (d) Reserve Bank of India Act

➢ **Some of the important concepts introduced in the IT ACT,2000 are :**

- Electronic record
- Secure electronic record
- Digital signature
- Secure digital signature
- Certifying authority
- Digital signature certificate.

➢ **Some of section under it act 2000 are given below :**

Section	Offence	Penalty
67A	Publishing images containing sexual acts.	Imprisonment up to seven years,or/and with fine up to Rs. 1,000,000
67B	Publishing child porn or predating children online.	Imprisonment up to five years, or/and with fine up to Rs. 1,000,000 on first conviction. Imprisonment up to seven years, or/and with fine up toRs. 1,000,000 on second conviction.
67C	Failure to maintain records.	Imprisonment up to three years, or/an with fine.
68	Failure/refusal to comply with orders.	Imprisonment up to three years, or/and with fine up to Rs. 200,000
69	Failure/refusal to decrypt data	Imprisonment up to seven years and possible line.
70	Securing access or attempting to secure access to a protected system	Imprisonment up to ten years, or/an with fine.
71	Misrepresentation	Imprisonment up to two years, or/an with fine up to Rs. 100,000

Technology and Society

➢ **e-Waste Management**

Scan to know more about this topic

e-waste management

- In most part of the world, underground water is not drinkable directly. Long ago, people simply used to draw up water from wells and drink it. But now, you have to use some sort of filter to purify the water and make it drinkable. Why? It is just one of the many problems and hazards of e-waste. The electronic devices, dead cells and batteries you throw away with other garbage contains lead that easily mixes with underground water, making it unfit for direct consumption. That is just the tip of the iceberg – the problems of e-waste disposal.
- This word has caught up in the recent past only when someone studying the subject noted that our environment will be 3x more congested with e-waste by 2017. E-waste is growing in huge volumes. The reason why e-waste is increasing is that technology is growing fast and in an attempt to get better devices, we casually get rid of old electronics – the best examples being that of smart-phones.
- One may ask the relationship between old electronics and e-waste. e-waste is actually the old electronic goods that people simply give away to garbage trucks that are then dumped into landfill or similar sites.

Electronics have a number of harmful elements that react with air and water to create problems of e-waste such as water, air and soil pollution as well as problems that affect human beings in the form of diseases.

- In the above example, we used old cells and batteries as an example. Most of the cheaper batteries are lead based and easily react with water (rain or moisture) to seep and mix with underground water along with polluting the soil and air where it was disposed by the garbage department.
- Thus, everything that falls into electronics category, that you intend to throw away, is e-waste (electronic waste). This includes computers, laptops, tablets, smart-phones and so on. There are proper methods to dispose off electronic items. They should be handled differently, but unfortunately, even the developed countries do not have strong policies to take care of such harmful, toxic garbage.
- The solder present on the motherboard of computers and TV contain high levels of lead. Even the glass panels of computer monitors and of course, the lead batteries contaminate air, water, and soil. In addition, they distort the process of brain development, while posing danger to central nervous system and kidneys. This (lead poisoning) is among the most dangerous hazards of e-waste.
- Other than lead, motherboards also have high levels of Mercury. Improper disposal may create skin and respiratory disorders. Mercury poisoning also causes acute brain damages.
- The cables and PVC panels as well as glass, when reacts with moisture and oxygen, creates hazardous soil that may not be suitable for even building a home as the people breathing that air will suffer from reproduction and proper development of body parts, including the brain. It also spoils the immune system. Stress, anxiety, and other mental problems that can arise out of breathing air polluted with glass, PVC and other forms of plastic remains found in electronic items.
- The motherboard circuits can cause lung cancer when you breathe air polluted by the fumes released when the motherboard elements react and create Beryllium. It is also responsible for skin diseases, including warts and certain forms of dangerous allergies.

➢ **Treating e-Waste**

- As of now, there are no proper methods being implemented even in the first world to eliminate the problem of e-waste. The two methods that found interesting for proper treatment of e-waste are recycling and refurbishing.
- For recycling, there may be products that cannot be recycled completely. PVC layers, for example, stay as such for ages and cannot be recycled. It would be better if the manufacturers use recyclable material so that the e-waste is converted into something that can be used again without harming the planet and its inhabitants. Thus, one of the major factors in treating e-waste is to compel manufacturers to use green elements.
- If electronics are refurbished, they can be sold again at a lower price. Thus, both the society and environment will be benefited. Instead of simply dumping your old TV into the garbage bin, you might want to think about calling the vendor and ask him where to present the item for refurbishing. If you cannot find, consider donating the item to some charity that can either use it as such or get it repaired and use it. I do not think it is a practice well implemented, but it would be nice if all vendors provide a refurbishing facility.

➢ **Proper disposal of used electronics gadgets**

- Following are the proper steps to dispose e-waste.

1. Some companies will offer free take back services. Nokia and Lenovo in China are on the forefront of free take back services.
2. The minamata Convention is a worldwide effort to discontinue the use of mercury in health care by the year 2020. Thermometers and sphygmomanometer are being replaced by newer and safer health care apparatuses. However old school physicians still like the classical mercury sphygmomanometer which is way they still remain on the market. Health care facilities will have to make sure about the exact life span of medical equipment prior to purchase and how to dispose when they expire. Minamata Convention is able to trace mercury substances from the beginning of its production till its disposal.
3. There is a movement to prohibit the export of second hand electronics to Africa. This will have a major impact on the ability of developing countries of reaching the goals of the United Nations Millennium Development. Even though technically the problem is not with the equipment it is with the lack of e waste regulation.

There is also a new company called, East African Compliant Recycling. It is a full scale e waste recycling plant that will e launched in Nairobi, Kenya. This plant will be the model that will eventually be used throughout Africa. Not only will it prevent unsafe waste disposal for the environment and the people, but it will create jobs and recover valuable materials that can be sold and reused.

4. It is also crucial for America to learn from Japan. This country has been in the forefront of e waste management. Already in the 1990's, Japan was the first country to enact e waste laws. The Japanese model has been admired by Russia as well. Japan recycles more than 2 million tons of e waste each year. As opposed to America with only 679,000 tons annually. In 2000, Japan introduced , the Manifest System. This procedure beings tracking e waste form the time it leaves the facility where it was produced initially until it reaches the e final e waste facility. No other country has this cradle to grave system yet.

   According to the Department of Japanese Studies, Japan is the most environmentally aware country in the world. Chris McMoran stated that the reason that Japan is one on the cutting edge of this e waste management is due largely to its tragic history with industrial waste as well as pollution during the decades immediately post war.

   Reusable metals in Japan are being recycled in very practical ways. Instead of spending money importing these rare metals why not retrieve them and send them back to a factory in Japan to be used productively again ? The bottom line is money talks. Even though Japan is being praised for being at the forefront of the worldwide "green" campaign, it is more the profit motive than the love of nature that is the catalyst.

   It is compulsory to recycle items such as automobiles, computers and other electronic equipments in Japan. it impels recycling by imposing strict laws on both the consumers themselves and the manufacturers or electronic components.

   As notes, not only is e waste recycling a green conscious effort, it is also motivated by profit. The revenue is expected to bring in one trillion yen by the year 2020.

5. We must help developing countries improve the working conditions for all e waste workers so that they will properly protected. One hundred percent elimination of child labour in this industry paramount.

- Instead of automatically buying a new PC, consider upgrading software or hardware on your present computer. Search for charity organizations in your vicinity that may want your old electronics. There are local electronic donations centres in most towns.

➢ **Awareness about health concerns related to the usage of technology**

As digital technologies have penetrated into different fields, we are spending more time in front of screens, be it mobile, laptop, desktop, television, gaming console, music or sound device. But interacting in an improper posture can be bad for us-both physically and mentally. Besides, spending too much time on the Internet can be addictive and can have a negative impact on our physical and psychological well being.

Here are a few key considerations around technology use and how it affects our health :

(i) Eyes strain : When we gaze at a screen for long periods of time, we often forget to blink. In fact, research has shown that digital eye strain reduces our blink rate by half, which means the tears that protect our eyes evaporate without being replaced. Additionally, reading the smaller fonts on a smartphone or other portable device can intensify the strain.

(ii) Sleep Disorders : We loves our devices so much that many of us even sleep with them. One study found that 72% of smartphone owners keep their phone next to their bed at night to ensure they do not miss a thing. It might seen like a harmless habit but late night technology use can interfere with your ability to sleep.

To avoid sleep disruption, try replacing late night technology use with sleep conducive activities such as taking a bath or reading in bed. Resisting the urge to keep your phone on your nightstand can also help minimize nighttime interruptions.

(iii) Physical Inactivity : When we are using technology like computers, video games or TVs, we generally are not exercising. That's why there's an increasing body of research linking the overuse of digital devices to decreasing exercise and fitness levels.

Logically, spending more time on watching TV or playing video games reduces the time you spend staying active.

(iv) Mental Health : More than three billion people interact with each other over social media every day. While many of our exchanges are generally harmless, over-using these services can impact our well being. Social media addiction is linked to a rise in mental health disorders like depression, suicidal ideation, particularly in teenagers. Researchers mode that correlation by highlighting how platforms like Facebook, Instagram and Twitter place higher social pressures on young people and adults that can lead to instances of cyberbullying, increased need for approval and general feelings of discontent.

➢ **e-Waste management Rules in India**

The Environment, Forest, and Climate Change Ministry (MoEF&CC) have announced the E-Waste Management Rules 2016. These new rules replaced the earlier E-Waste (Management and Handling) Rules of 2011.

The New Rules make for stricter norms and are a part of the government's increased commitment towards environmental governance.

Highlight of the new e-Waste Management Rules 2016 :

1. It includes CFLs or Compact Fluorescent Lamps as well as other lamps with mercury, and similar equipment.
2. The Rules for the first time, bring producers under the ambit to the Extended Producer Responsibility or EPR together with the targets.
3. Producers have been made accountable for e-waste collection and e-waste exchange as well.
4. Additional stakeholder included are :

   (a) Manufacturers

   (b) Dealers
5. Compact Fluorescent Lamp (CFL) and other mercury-containing lamps have been brought under the purview of the rules.

   India's Environment Ministry has notified rules targeting the wide range of groups like hotels, residential colonies, bulk producers of consumer goods, ports, railway stations, airports and pilgrimage sports. This is to ensure that the solid waste generated in their facilities is treated and recycled.

Know the Terms

PCB – Pollution Control Board

ICT – Information and Communication Technology

EPA – Environmental Protection Agency

PVC – Polyvinyl Chloride

UNDP – United Nations Development Program

GHE – Green House Effect

CFC – ChloroFluoroCarbon

CRT – Cathode Ray Tube

TFT – Thin Film Transistors

LED – Light Emmited Diode

STAND ALONE MCQs (1 Mark each)

Q. 1. After practicals, Atharv left the computer laboratory but forgot to sign off from his email account .Later, his classmate Revaan started using the same computer. He is now logged in as Atharv. He sends inflammatory email messages to few of his classmates using Atharvs email account. Revaansh activity is an example of which of the following cybercrime? Justify your answer. **(NCERT)**

(A) Hacking **(B)** Identity theft

(C) Cyber bullying **(D)** Plagiarism

Ans. Option (B) is correct.

Explanation : Identity theft is the crime of obtaining the personal or financial information of another person to use their identity to commit fraud, such as making unauthorized transactions or purchases.

Q. 2. Rishika found a crumpled paper under her desk. She picked it up and opened it. It contained some text which was struck off thrice. But she could still figure out easily that the struck off text was the emailID and password of Garvit, her classmate. What is ethically correct for Rishika to do? **(NCERT)**

(A) Inform Garvit so that he may change his password.

(B) Give the password of Garvit's email ID to all other classmates.

(C) Use Garvit's password to access his account.

Ans. Option (A) is correct.

> ***Explanation*** **:** Never write down your passwords on a sticky paper and hide underneath your workstation or telephone. Somebody will find it

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

(A) Fair use

(B) Hacking

(C) Copyright infringement

(D) Cyber crime

Ans. Option (C) is correct.

> ***Explanation :*** Copyright infringement refers to the unauthorized use of someone's copyrighted work.

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

(A) You sent an email to your friend with a message saying that "I am sorry".

(B) You sent a threatening message to your friend saying "Do not try to call or talk to me".

(C) You created an embarrassing picture of your friend and uploaded on your account on a social networking site.

Ans. Option (A) is correct.

> ***Explanation*** **:** Cyberbullying or cyber harassment is a form of bullying or harassment using electronic means. Cyberbullying and cyber harassment are also known as online bullying.

Q. 5. _____ deals with the protection of an individual's information which is implemented while using the Internet on any computer or personal device.

(A) Digital agony

(B) Digital privacy

(C) Digital secrecy

(D) Digital protection

Ans. Option (B) is correct.

> ***Explanation :*** The concept of digital privacy can best be described as the protection of the information of private citizens who use digital mediums.

Q. 6. Which of the following is not a private Search-engine?

(A) Yahoo **(B)** DuckDuckGo

(C) StartPage **(D)** Wolfram Alpha

Ans. Option (A) is correct.

> ***Explanation :*** Private Search Engines are the search engines that do not store your queries or track your steps on the Internet.

Q. 7. Which of the following is a private Search-engine and do not track our searching data?

(A) Google **(B)** Search Encrypt

(C) Bing **(D)** Yahoo

Ans. Option (B) is correct.

> ***Explanation :*** Search Encrypt is available as a browser extension for Chrome and Firefox.

Q. 8. Which of the following browser is used for Privacy purpose?

(A) Chrome **(B)** Firefox

(C) Opera **(D)** Tor

Ans. Option (D) is correct.

> ***Explanation :*** Tor, short for The Onion Router, is free and open-source software for enabling anonymous communication.

Q. 9. The data transferred between your device & the server is securely _____ if you're using VPNs.

(A) locked **(B)** sealed

(C) packed **(D)** encrypted

Ans. Option (D) is correct.

> ***Explanation :*** Encryption is the process of encoding information.

Q. 10. Exploring appropriate and ethical behaviours related to online environments and digital media.

(A) Cyber ethics **(B)** Cyber security

(C) Cyber safety **(D)** Cyber law

Ans. Option (A) is correct.

> ***Explanation :*** "Cyber ethics" refers to the code of responsible behavior on the Internet.

Q. 11. The data taken from a digital footprint can be used for

(A) Hacking **(B)** Only for feedback

(C) Showing relevant ads

(D) All of these

Ans. Option (D) is correct.

> *Explanation :* Digital footprint means the impressions left on the browsers after using the internet.

Q. 12. Which of the following type of digital footprints created by the user intentionally with their active consent

(A) Active digital footprint

(B) Passive digital footprint

(C) Massive digital footprint

(D) Interactive digital footprint

Ans. Option (A) is correct.

> *Explanation :* An active digital footprint is where the user has deliberately shared information about themselves either by using social media sites or by using websites.

Q. 13. Which of the following digital footprints can be created without the user's consent?

(A) Active digital footprint

(B) Passive digital footprint

(C) Massive digital footprint

(D) Interactive digital footprint

Ans. Option (B) is correct.

> *Explanation :* A passive digital footprint is a data trail you unintentionally leave online.

Q. 14. The digital footprint can be saved in which of the following locations?

(A) Download folder **(B)** User account

(C) Browser settings and web server

(D) Google Drive

Ans. Option (C) is correct.

> *Explanation :* There are two main storages of digital footprints:
> Browser Settings : The digital footprints can be saved in browser history, cookies, password, auto fill data etc.
> Web Server and Database: Every website has its own database. When the user enters data and fills it up to them it can be saved in the database.

Q. 15. Which of the following action can be taken to keep the digital footprint clean?

(A) Search what information you leftover social media and the internet

(B) Be smart and sensible while using any website, sending an email or opening a link

(C) Control visibility settings from the browser or website/app settings

(D) Remove any private details like mobile number, school, college name, address, photos etc.

Ans. Option (D) is correct.

> *Explanation :* The user's should restrain from over sharing digital footprint and be more vigilant in its usage as there are possibility of risk of cyber bullying, identity theft, humiliation and embarrassment beside violation of privacy.

Q. 16. Data protection refers to protect data from :

(A) Substantial Harm

(B) Embarrassment

(C) Inconvenience and unfairness

(D) All of these

Ans. Option (D) is correct.

> *Explanation :* Data protection is a set of strategies and processes you can use to secure the privacy, availability, and integrity of your data.

Q. 17. Typing in all capitals in electronic communications means :

(A) this message is very important.

(B) you are shouting.

(C) it's okay to forward this message to others.

(D) nothing special--typing in all caps is normal.

Ans. Option (B) is correct.

> *Explanation :* Email etiquette is the use of appropriate language, conventions and formality in an email.

Q. 18. It is OK to forward or post an email message that you received if

(A) the message is typed in all capitals.

(B) the author of the message has given you permission to forward or post it.

(C) it does not contain any copyrighted material.

(D) the author of the message hasn't marked it as confidential.

Ans. Option (B) is correct.

Q. 19. The Golden Rule of Netiquette is

(A) remember the human

(B) a smiley in every message

(C) follow the other rules of netiquette

(D) never flame a friend

Ans. Option (A) is correct.

> *Explanation :* Netiquette, or network etiquette, is concerned with the "proper" way to communicate in an online environment.

Q. 20. Knowledge and understanding of netiquette is useful because

(A) it will help you create a positive impression on those you meet in cyberspace.

(B) it explains some of the technical limitations of online communications.

(C) it explains the conventions already being used by millions of cybernauts.

(D) all of the above.

Ans. Option (D) is correct.

> ***Explanation :*** Netiquette is a combination of the words network and etiquette and is defined as a set of rules for acceptable online behavior. Similarly, online ethics focuses on the acceptable use of online resources in an online social environment.

Q. 21. Include a subject line

(A) only when you are writing an official memo.

(B) only in personal memos.

(C) if the person you are sending it to requires one.

(D) in all e-mail messages.

Ans. Option (D) is correct.

> ***Explanation :*** An email message is a text, typically brief and informal, that is sent or received over a computer network.

Q. 22. Which of the following is not 'open source' software

(A) Linux **(B)** Ubuntu

(C) open office **(D)** windows 10

Ans. Option (D) is correct.

> ***Explanation :*** Open-source software is computer software that is released under a license in which the copyright holder grants users the rights to use, study, change, and distribute the software and its source code to anyone and for any purpose.

AI **Q. 23.** Which of the following is not covered under IPR ?

(A) Music **(B)** Insurance

(C) Logo designed **(D)** Invention

Ans. Option (B) is correct.

> ***Explanation :*** Intellectual property rights include patents, copyright, industrial design rights, trademarks, plant variety rights, trade dress, geographical indications,[29] and in some jurisdictions trade secrets.

AI **Q. 24.** Which of the following software allows copy, free use, redistribution and modification?

(A) Licensed

(B) Free and Open Source Software (FOSS)

(C) General Public License (GPL)

(D) All of these

Ans. Option (B) is correct.

> ***Explanation :*** Free and open-source software is software that can be classified as both free software and open-source software.

Q. 25. The trademark product denoted by _____ symbols.

(A) ® or ™ **(B)** ©

(C) ! **(D) None of these**

Ans. Option (A) is correct.

> ***Explanation :*** A trademark is a type of intellectual property consisting of a recognizable sign, design, or expression which identifies products or services of a particular source from those of others.

Q. 26. Intellectual property is legally protected by

(A) copyright **(B)** patents

(C) trademarks **(D)** all of these

Ans. Option (D) is correct.

> ***Explanation :*** IP is protected in law by, for example, patents, copyright and trademarks, which enable people to earn recognition or financial benefit from what they invent or create.

Q. 27. Intellectual Property Rights protect the use of information and ideas that are of:

(A) Ethical Value **(B)** Moral Value

(C) Social Value **(D)** Commercial Value

Ans. Option (D) is correct.

AI **Q. 28.** The term "Intellectual Property Rights" covers:

(A) Copyrights **(B)** Trademarks

(C) Patents **(D)** All of these

Ans. Option (D) is correct.

> ***Explanation :*** Intellectual property rights are legal rights that provide creators protection for original works, inventions, or the appearance of products, artistic works, scientific developments, and so on.

Q. 29. Which of the following is a/an open-source software?

(A) Microsoft Windows

(B) Adobe Photoshop

(C) MySQL

(D) MS Powerpoint

Ans. Option (C) is correct.

> ***Explanation :*** MySQL is an open-source relational database management system.

Q. 30. Intellectual property is a .....

(A) industrial property **(B)** copyright property

(C) Both **(A)** and **(B)** **(D)** None of these

Ans. Option (C) is correct.

Q. 31. The following cannot be exploited by assigning or by licensing the rights to others.

(A) Patents **(B)** Designs

(C) Trademark **(D)** All of the above

Ans. Option (C) is correct.

> *Explanation :* A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises.

Q. 32. The following can be patented

(A) Machine

(B) Process

(C) Composition of matter

(D) All of the above

Ans. Option (D) is correct.

> *Explanation :* The three types of patents are utility patents, design patents, and plant patents.

AI **Q. 33.** When someone steals someone else's personal information to commit theft or fraud, it is called_____

(A) Identity theft **(B)** Hacking

(C) Computer piracy **(D)** Infringement

Ans. Option (A) is correct.

> *Explanation :* The four types of identity theft include medical, criminal, financial and child identity theft.

Q. 34. A is someone who breaks into someone else's computer system, often on a network; bypasses passwords or licenses in computer programs without malicious intent with a wish to learn and improve security.

(A) hacker **(B)** cracker

(C) worm **(D)** malware

Ans. Option (A) is correct.

> *Explanation :* Hacking is an attempt to exploit a computer system or a private network inside a computer.

Q. 35. The programmers who break into secure systems for malicious purpose are

(A) crackers **(B)** hackers

(C) breakers **(D)** burglars

Ans. Option (A) is correct.

> *Explanation :* Hackers are the ethical professionals. Crackers are unethical and want to benefit themselves from illegal tasks.

Q. 36. One limitation of antivirus programs is that they:

(A) Sometimes start behaving like virus

(B) Are very expensive

(C) Harm the computer

(D) Can detect only those viruses for which they are programmed

Ans. Option (D) is correct.

> *Explanation :* An antivirus is software that protects against computer viruses, a type of malware that self-replicates by inserting its code into other software programs.

Q. 37. To avoid problems while working on the Internet, you should follow these precautions.

(A) Install antivirus on your computer

(B) Take the backup of your files regularly

(C) Do not click on unknown links

(D) All of the above

Ans. Option (D) is correct.

> *Explanation :* Antivirus is used to identify, prevent and take action against malicious programs such as viruses and worms, by deactivating or deleting them.

AI **Q. 38.** The electronic equivalent of junk mail is known as

(A) adware **(B)** cyber fraud

(C) spam **(D)** packets

Ans. Option (C) is correct.

> *Explanation :* Spam email is unsolicited and unwanted junk email sent out in bulk to an indiscriminate recipient list. Typically, spam is sent for commercial purposes.

Q. 39. A category of software that spies of your computer activities is

(A) De-ware **(B)** Spyware

(C) Utilities **(D)** Freeware

Ans. Option (B) is correct.

> *Explanation :* Spyware is loosely defined as malicious software designed to enter your computer device, gather data about you, and forward it to a third-party without your consent.

AI **Q. 40.** A ……. is a software program that is designed to copy itself from one computer to another, without human intervention.

(A) trojan **(B)** virus

(C) worm **(D)** spam

Ans. Option (C) is correct.

> *Explanation :* The primary difference between a virus and a worm is that viruses must be triggered by the activation of their host; whereas worms are stand-alone malicious programs that can self-replicate and propagate independently as soon as they have breached the system.

Q. 41. A …….. is a virus that is often disguised as a useful computer program.

(A) trojan horse **(B)** hacker

(C) worm **(D)** spam

Ans. Option (A) is correct.

Explanation : A Trojan is designed to damage, disrupt, steal, or in general inflict some other harmful action on your data or network. A Trojan acts like a bona fide application or file to trick you.

AI **Q. 42.** A good way to safeguard access to your computer is to protect it.

(A) Deadbolt **(B)** Copyright

(C) Safemode **(D)** Password

Ans. Option (D) is correct.

Explanation : A password, sometimes called a passcode, is secret data, typically a string of characters, usually used to confirm a user's identity.

Q. 43. _____ helps to classify arguments and situations, better understand a cyber-crime and helps to determine appropriate actions.

(A) Cyber-ethics **(B)** Social ethics

(C) Cyber-bullying **(D)** Corporate behaviour

Ans. Option (A) is correct.

Explanation : "Cyber ethics" refers to the code of responsible behavior on the Internet.

AI **Q. 44.** When a person is harassed repeatedly by being followed, called or be written to he /she is a target of

(A) Bullying **(B)** Identity theft

(C) Stalking **(D)** Phishing

Ans. Option (C) is correct.

Explanation : Some examples of cyber stalking include: Sending manipulative, threatening, lewd or harassing emails from an assortment of email accounts.

Q. 45. _____ is a type of software designed to help the user's computer detect viruses and avoid them.

(A) Malware **(B)** Adware

(C) Antivirus **(D)** Both **(B)** and **(C)**

Ans. Option (C) is correct.

Explanation : Antivirus software is a class of applications that protect computers and remove malicious software or code designed to damage computers or data.

Q. 46. Hackers usually used the computer virus for _____ purpose.

(A) To log, monitor each and every user's stroke

(B) To gain access the sensitive information like user's Id and Passwords

(C) To corrupt the user's data stored in the computer system

(D) All of the above

Ans. Option (D) is correct.

Explanation : In general, hackers use computer viruses to perform several different tasks such as to corrupt the user's data stored in his system, to gain access the important information, to monitor or log each user's strokes.

AI **Q. 47.** Which of the following is not a type of a cybercrime?

(A) Data theft

(B) Forgery

(C) Damage to data

(D) Installing antivirus for protection

Ans. Option (D) is correct.

Explanation : The computer may have been used in the commission of a crime, or it may be the target. Cybercrime may harm someone's security and financial health.

Q. 48. In which year India's IT Act came into existence ?

(A) 2000 **(B)** 2001

(C) 2002 **(D)** 2003

Ans. Option (A) is correct.

Explanation : IT ACT is the primary law in India dealing with cybercrime and electronic commerce.

Q. 49. What is/are component of IT Act 2000 ?

(A) Legal Recognition to Digital Signatures

(B) Regulation of Certification Authorities

(C) Digital Certificates

(D) All the above

Ans. Option (D) is correct.

Explanation : The primary objectives of the IT Act, 2000 are: Granting legal recognition to all transactions done through electronic data exchange, other means of electronic communication or e-commerce in place of the earlier paper-based communication.

Q. 50. In which year the Indian IT Act, 2000 got updated ?

(A) 2006 **(B)** 2008

(C) 2010 **(D)** 2012

Ans. Option (D) is correct.

Explanation : The IT (Amendment) Act, 2008 (ITAA 2008) has established a strong data protection regime in India. It addresses industry's concerns on data protection, and creates a more predictive legal environment for the growth of e-commerce that includes data protection and cyber crimes measures, among others.

Q. 51. What is the name of the IT law that India is having in the Indian legislature?

(A) India's Technology (IT) Act, 2000

(B) India's Digital Information Technology (DIT) Act, 2000

(C) India's Information Technology (IT) Act, 2000

(D) The Technology Act, 2008

Ans. Option (C) is correct.

> *Explanation :* The new IT Act empowers the Indian government to intercept, monitor and decrypt computer systems, resources and communication devices.

Q. 52. What is E-Waste?

(A) Edible Waste **(B)** Easter Waste

(C) Electronic Waste **(D)** Eternal Waste

Ans. Option (C) is correct.

> *Explanation :* E-waste contains a laundry list of chemicals that are harmful to people and the environment, like: mercury, lead, beryllium, brominated flame retardants, and cadmium, i.e. stuff that sounds as bad as it is.

Q. 53. In India, E-Waste management assumes greater significance because

(A) generation of own e-waste

(B) dumping of e-waste from developed countries

(C) lack of awareness

(D) All of these

Ans. Option (D) is correct.

> *Explanation :* E-waste is a health and environmental hazard because it contains toxic additives or hazardous substances such as mercury.

Q. 54. WEEE is almost _____ % of e-waste from solid waste.

(A) 5 **(B)** 10

(C) 15 **(D)** 20

Ans. Option (A) is correct.

> *Explanation :* Under the WEEE system, householders have a duty to dispose of their electrical waste properly.

AI **Q. 55.** Which of the following is one of the impacts of e-waste on the environment?

(A) Global Warming **(B)** deforestation

(C) soil erosion **(D)** emission of gases

Ans. Option (D) is correct.

> *Explanation :* When this e-waste is not properly handled and simply thrown out with the garbage, ultimately ending up in landfill, it means both human health and the environment are at risk

Q. 56. When circuits burnt for disposals, it creates which of the following harmful chemical?

(A) beryllium **(B)** **lead**

(C) copper **(D)** **mercury**

Ans. Option (A) is correct.

> *Explanation :* E-waste can be toxic, is not biodegradable and accumulates in the environment, in the soil, air, water and living things.

Q. 57. Beryllium can causes

(A) skin disease or allergies or increase the risk of lung cancer

(B) can damage human's kidney, brain and human nervous system

(C) neurological disorders

(D) damage live and bones

Ans. Option (A) is correct.

> *Explanation :* While most commonly associated with diseases of the lungs, beryllium may also affect such organs as the liver, kidneys, heart, nervous system, and the lymphatic system. Direct contact with beryllium fumes or dusts may injure the exposed areas of the body, such as the eyes or the skin.

Q. 58. The insulated wire has copper which causes _____

(A) skin disease or allergies or increase the risk of lung cancer

(B) can damage human's kidney, brain and human nervous system

(C) neurological disorders

(D) damage live and bones

Ans. Option (C) is correct.

> *Explanation :* Recovering resalable copper by burning insulated wires causes neurological disorders, and acute exposure to cadmium, found in semiconductors and chip resistors, can damage the kidneys and liver and cause bone loss.

AI **Q. 59.** The plastic used in the electronic gadgets causes

(A) skin disease or allergies or increase the risk of lung cancer

(B) damages the immune system of the body and leads to stress and anxiety

(C) neurological disorders

(D) damage live and bones

Ans. Option (B) is correct.

> *Explanation :* Informal processing of e-waste in developing countries can lead to adverse human health effects and environmental pollution.

AI **Q. 60.** Which of the following reduce e-waste?

(A) purchasing more and more gadgets

(B) using them for a short time and then discarded

(C) good maintenance

(D) all of these

Ans. Option (C) is correct.

> *Explanation :* The best solution for the treatment of electronic wastes is to recycle it.

Q. 61. Polluters pay Principle means

(A) anyone causing the pollution will pay for the damage caused

(B) polluters paid well by NGOs

(C) polluters may get a bonus

(D) polluters are not the cause of pollution

Ans. Option (A) is correct.

Explanation : The 'polluter pays' principle is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment.

Q. 62. Who is responsible for the disposal of the product when it becomes e-waste?

(A) the sellers **(B)** the producers

(C) the customers **(D)** the vendors

Ans. Option (B) is correct.

Explanation : There are two components to every electronic device; hardware and software, but only one component becomes e-waste. It will be interesting to see how software advancements can reduce our dependence on hardware and in turn help to minimize the amount of e-waste is created in the first place.

Q. 63. Which of the following element make e-waste hazardous in nature?

(A) Lead **(B)** Glass

(c) Plastic **(D)** Iron

Ans. Option (A) is correct.

Explanation : The presence of elements like lead, mercury, arsenic, cadmium, selenium, hexavalent chromium, and flame retardants beyond threshold quantities make e-waste hazardous in nature.

Q. 64. What is the hazardous pollutant released from LED's?

(A) Arsenic **(B)** Barium

(C) Cobalt **(D)** Cadmium

Ans. Option (A) is correct.

Explanation : Semiconductors, diodes, microwaves, LED's (Light-emitting diodes), solar cells releases arsenic into the environment.

Q. 65. What is the hazardous pollutant released from electron tubes?

(A) Arsenic **(B)** Barium

(C) Cobalt **(D)** Cadmium

Ans. Option (B) is correct.

Explanation : Electron tubes, filler for plastic and rubber, lubricant additives releases barium into the environment.

Q. 66. What is the hazardous pollutant released from batteries?

(A) Arsenic **(B)** Barium

(C) Cobalt **(D)** Cadmium

Ans. Option (D) is correct.

Explanation : Batteries, pigments, solder, alloys, circuit boards, computer batteries, monitor cathode ray tubes (CRT) releases cadmium when handled improperly.

ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions a statement of Assertion (A) is followed by a statement of reason (R). Mark the correct choice as :

(A) Both Assertion (A) and reason (R) are true and reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and reason (R) are true but reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

Q. 1. Assertion (A) : Digital footprint is nothing but the record of what a person do online.

Reason (R) : Digital footprint includes e-mail you sent, information you shared, websites you visited and the activities you took part online.

Ans. Option (B) is correct.

Explanation : Whatever a person be on internet creates his usage or we can say left a shadow behind of that activity and all these activities shadow creates your identity, this identity is called digital footprint.

Q. 2. Assertion (A) : Digital footprints are also termed as Digital Tattoos.

Reason (R) : A digital tattoo can also refer to the record of someone's actions and communications online and its permanence, like a physical tattoo.

Ans. Option (A) is correct.

Explanation : The digital world we live in is permanent and, with each post, kids are creating a digital footprint. A digital footprint (sometimes called digital tattoo) is the information that exists online about you and your activity.

Q. 3. Assertion (A) : Data privacy is the aspect of information technology which deals with the sharing of personal information to the second parties.

Reason (R) : Personal information includes date of birth, personal identity information like biometric information, etc.

Ans. Option (D) is correct.

> *Explanation :* Data privacy is the aspect of information technology which deals with the sharing of personal information to the third parties.

Q. 4. Assertion (A) : Cyber safety addresses the ability to act in a safe and responsible manner on the Internet and other connected environments.

Reason (R) : Netiquette is the short form of "internet etiquette" or communication etiquettes over the internet.

Ans. Option (B) is correct.

> *Explanation :* Cyber safety is the act all about the responsible and safe use of Internet services by dealing with the risk which is associated using the Internet.
> In real world, we use a manner to talk so that the exact meaning could successfully convey to the listener. On Internet, this manner is known as Netiquettes which help the user to get exact idea of what is said.

Q. 5. Assertion (A) : Open source software is usually developed as a public collaboration and made freely available.

Reason (R) : Intellectual property refers to the inventions,literary and artistic expressions, design and symbols, names and logos.

Ans. Option (B) is correct.

> *Explanation :* Open source refers to any program whose source code is made available for use or modification to users or other developers seefit.
> Intellectual property is legally protected through copyrights, patents, trademarks etc.

Q. 6. Assertion (A) : The intellectual property rights must be protected.

Reason (R) : Protecting intellectual property rights encourages individuals and business to create new software and new software applications, as well as improving existing applications.

Ans. Option (A) is correct.

> *Explanation :* Intellectual property is legally protected through copyrights patents, trademarks etc.

Q. 7. Assertion (A) : Direct Plagiarism is the word to word transcription of a section of someone else work without attribution and without quotation marks.

Reason (R) : Self Plagiarism occurs when a student submits his or her own previous work or mixes parts of previous work without permission from all professors involved.

Ans. Option (B) is correct.

> *Explanation :* Presenting someone else's idea or works as one's own idea or work is called plagiarism.

Q. 8. Assertion (A) : Patent does not give full control to the patentee to decide whether or how the invention can be used by others.

Reason (R) : Apache is the most popular web server software that enables a computer to host one or more websites.

Ans. Option (D) is correct.

> *Explanation :* Patent gives full control to the patentee to decide whether or how the invention can be used byothers.
> Creative commons (CC) License is a public copyright license that enables free distribution of a copyrighted work.

Q. 9. Assertion (A) : Open source technology is a growing trend in GIS.

Reason (R) : One major reason for the growth and use of FOSS technology is because users have access to the source so it is much easier to fix faults and improve the applications.

Ans. Option (A) is correct.

> *Explanation :* Open source software is software in which the source code used to create the program is freely available for the public to view, edit, and redistribute.

Q. 10. Assertion (A) : Hacking is the act of unauthorised access to a computer, computer network or any digital system.

Reason (R) : Cyber crime refers to the use of a computer to commit a crime.

Ans. Option (B) is correct.

> *Explanation :* Hackers usually have technical expertise of the hardware and software. They look for bugs to exploit and break into the system.
> Some examples of cyber crime include credit card and identity theft, network intrusions and software piracy.

Q. 11. Assertion (A) : It is important to secure your wireless router at home.

Reason (R) : Securing the wireless router is important because anybody within the area of Wi-Fi signal can connect to it and use it for himself or can also attack on your devices and data.

Ans. Option (A) is correct.

Explanation : You have two major security issues to deal with. The first is that you need to control who can actually get on your network. The second problem is that of the signal footprint. If people outside your home can pick up a signal from your router, they can also capture data and reap all of your passwords.

Q. 12. Assertion (A) : Cyber bullying and trolling harass victim mentally and physically.

Reason (R) : The Parliament of India passed its first Cyber law on the 17th October 2000, the Information Technology (IT) Act, 2003, which provides the legal infrastructure for e-commerce in India.

Ans. Option (C) is correct.

Explanation : Cyber bullying and trolling cause serious effect on victims even sometimes victims could not handle it then this becomes the reason of their sudden demise.
The Parliament of India passed its first Cyber-law on the 17th October 2000, the Information-Technology (IT) Act, 2000, which provides the legal infrastructure for e-commerce in India.

Q. 13. Assertion (A) : Use strong password for web login, and change it periodically.

Reason (R) : The stronger your password, the more protected your computer will be from hackers and malicious software.

Ans. Option (A) is correct.

Explanation : Passwords provide the first line of defense against unauthorized access to your computer and personal information.

Q. 14. Assertion (A) : In most part of the world, underground water is not drinkable directly.

Reason (R) : The electronic devices, dead cells and batteries you throw away with other garbage contains lead that easily mixes with underground water, making it unfit for direct consumption.

Ans. Option (A) is correct.

Explanation : Electronics have a number of harmful elements that react with air and water to create problems of e-waste such as water, air and soil pollution as well as problems that affect human beings in the form of diseases.

Q. 15. Assertion (A) : Informal processing of electronic waste in general lead to various health and pollution problems.

Reason (R) : Electronic waste contains toxic chemicals and metals like lead, cadmium, mercury etc. When they are disposed on land fills these chemicals get enter into surrounding soil, groundwater and ultimately reaches the human.

Ans. Option (A) is correct.

Explanation : Byre cycling electronic waste many hazardous as well as valuable and scarce materials can be found. Also,recycling raw materials from end-of-life electronics is the most effective solution to the growing e-waste problem.

Q. 16. Assertion (A) : E-waste management is also known as urban mining.

Reason (R) : Technology shapes different cultures and differentiates one from another.

Ans. Option (B) is correct.

Explanation : E-waste management is a technique in which the part of products which are dumped in as the e-waste can be either sold outro reused.
Technology influences everyday life and has a strong influence on culture.

Q. 17. Assertion (A) : According to Environmental Protection Act, 1980,anyone causing the pollution will pay for the damage caused.

Reason (R) : The Department of Information Technology(DIT) issued a comprehensive technical guide on"Environmental Management for Information Technology Industry in India."

Ans. Option (D) is correct.

Explanation : According to Environmental Protection Act, 1986, anyone causing the pollution will pay for the damage caused.
The DIT at the Indian Telephone Industries has set up demonstration projects showing how to recover copper from the Printed Circuit Boards.



CASE-BASED MCQs

Attempt any four sub-parts from each question. Each sub-part carries 1 mark.

I. Read the following text and answer the following questions on the basis of the same :

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

Q. 1. Smridh is a victim of _____ :

(A) Eavesdropping **(B)** Stolen identity

(C) Phishing **(D)** Cyber stalking

Ans. Option (D) is correct.

> *Explanation :* Cybers talking is the use of the Internet or other electronic means to stalk or harass an individual, group, or organization.

Q. 2. The action that Smridh should take :

(A) He should ONLY share with his friends

(B) He should NOT share with anyone as it can cause serious problem

(C) He should immediately report to the police

(D) He should bring to the notice of his parents and school authorities

Ans. Option (D) is correct.

Q. 3. _____ is a set of moral principles that governs the behaviour of a group of individual and regulates the use of computers.

(A) Copyright **(B)** Computer ethics

(C) Property rights **(D)** Privacy law

Ans. Option (B) is correct.

> *Explanation :* Computer ethics is a part of practical philosophy concerned with how computing professionals should make decisions regarding professional and social conduct.

Q. 4. Smridh needs to protect his personal information or data from uninternational and international attacks and disclosure which is termed as _____

(A) Digital right **(B)** Copy right

(C) Privacy **(D)** Intellectual property

Ans. Option (C) is correct.

> *Explanation :* Privacy relates to any rights you have to control your personal information and how it's used.

Q. 5. The act of fraudulently acquiring someone's personal and private information, such as online account name, login information and passwords is called is _____

(A) Phishing **(B)** Fraud

(C) Seeam **(D)** Plagiarism

Ans. Option (A) is correct.

> *Explanation :* Phishing is a type of online scam where criminals impersonate legitimate organizations via email, text message, advertisement or other means in order to steal sensitive information.

II. The school offers Wi-Fi to the students of Class XII. For communication, the network security-staff of the school is having a registered URL "school wifi.edu". On 17th September 2017, emails were received by all the students regarding expiry of their passwords. Instructions were also given renew their password within 24 hours by clicking on particular URL provided.

On the bases of the above case study, answer the questions given below :

Q. 1. Specify which type of cyber crime is it.

(A) Spamming **(B)** Phishing

(C) Identity Theft **(D)** Hacking

Ans. Option (B) is correct.

> *Explanation :* Phishing is a type of social engineering attack often used to steal user data, including login credentials and credit card numbers.

Q. 2. URL stands for _____

(A) Universal Resource Loader

(B) Universal Resource Locator

(C) Unite Research Loader

(D) Uniform Resource Locator

Ans. Option (B) is correct.

> *Explanation :* A URL (Uniform Resource Locator) is a unique identifier used to locate a resource on the Internet. It is also referred to as a web address.

Q. 3. Unsolicited commercial email is known as :

(A) Malware **(B)** Virus

(C) Spam **(D)** Spyware

Ans. Option (C) is correct.

> *Explanation :* Unsolicited means that the Recipient has not granted verifiable permission for the message to be sent.

Q. 4. Wi-Fi stands for _____

(A) Wireless Internet Frequent Interface

(B) Wireless Functioning

(C) Wireless Fidelity

(D) Wireless Free Internet

Ans. Option (C) is correct.

> *Explanation :* Wi-Fi, networking technology that uses radio waves to allow high-speed data transfer over short distances.

Q. 5. Ideally, what characters should be used in a password to make it strong?

(A) Letters and numbers only

(B) Mixed Case (Upper and Lower)

(C) Special characters

(D) All of above

Ans. Option (D) is correct.

> *Explanation :* A password, sometimes called a passcode, is secret data, typically a string of characters, usually used to confirm a user's identity.

III. Vidya Devi, a retired school principal, was inspired by her granddaughter who uses technology for her day to day activities. Being a learner and

teacher all her life, she wanted to open an email account and interact with her friends and family. Her granddaughter created an email account for her and gradually she started sending mails to her friends. This was a big achievement for her. Her granddaughter explained how emails are sent, how to create an email address, what protocols are used. Some of these details were too technical for her, but she never gave up. There are few doubts/ misconceptions in her mind which you can help her with.

Q. 1. Unsolicited e-mails advertising is known as _____

(A) newsgroup **(B)** junk ads

(C) spam **(D)** none of the above

Ans. Option (C) is correct.

> ***Explanation :*** Email spam is nothing but junk email or unsolicited bulk emails sent through the email system. It refers to the use of an email system to send unsolicited emails especially advertising emails to a group of recipients. Unsolicited emails mean the recipient did not grant permission for receiving those emails.

Q. 2. What of the following is the correct format of emails address ?

(A) name@website@info

(B) name@website.info

(C) www.nameoffwebsite.com

(D) name.website.com

Ans. Option (B) is correct.

> ***Explanation :*** A valid email address consists of an email prefix and an email domain, both in acceptable formats. The prefix appears to the left of the @ symbol. The domain appears to the right of the @ symbol.

Q. 3. Mail access starts with client when user needs to download email from the _____

(A) mail box **(B)** mail server

(C) IP server **(D)** Internet

Ans. Option (A) is correct.

> ***Explanation :*** A mailbox is the destination to which electronic mail messages are delivered. It is the equivalent of a letter box in the postal system.

Q. 4. To use email service, one needs to register with _____

(A) Internet Service Provider

(B) Email Service Provider

(C) A company

(D) No need to register

Ans. Option (A) is correct.

> ***Explanation :*** An Internet Service Provider (ISP) is a company such as AT&T, Verizon, Comcast, or Spectrum that provides Internet access to companies, families, and even mobile users.

Q. 5. Bcc stands for _____ to send the copy of mail.

(A) Black carbon copy

(B) Blue carbon copy

(C) Blind carbon copy

(D) Block chain copy

Ans. Option (C) is correct.

> ***Explanation :*** Bcc stands for blind carbon copy which is similar to that of Cc except that the Email address of the recipients specified in this field do not appear in the received message header and the recipients in the To or Cc fields will not know that a copy sent to these address.

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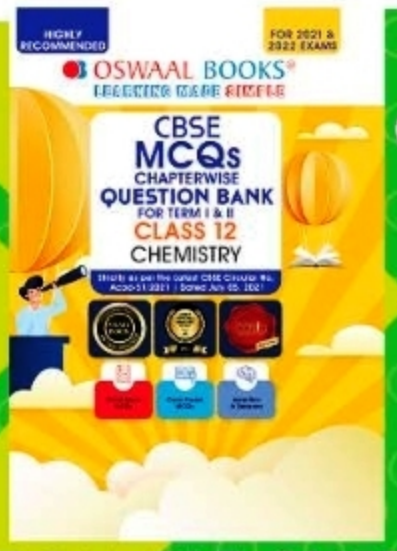

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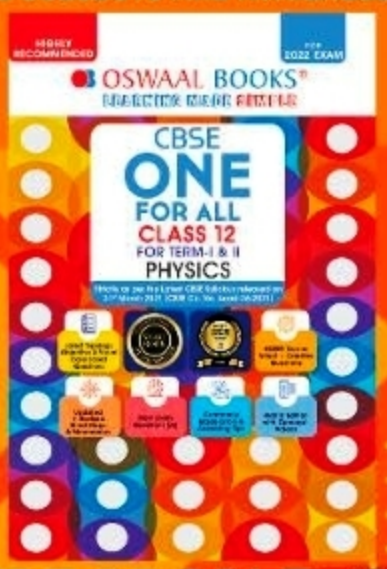

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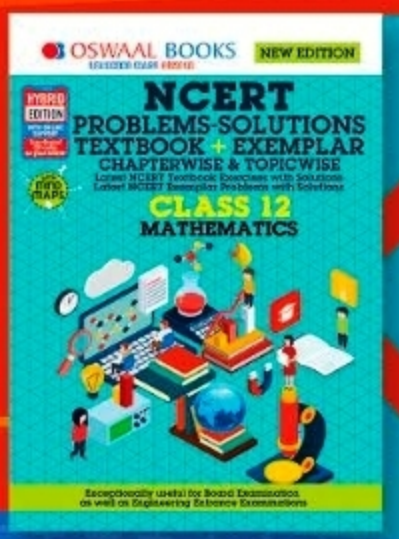

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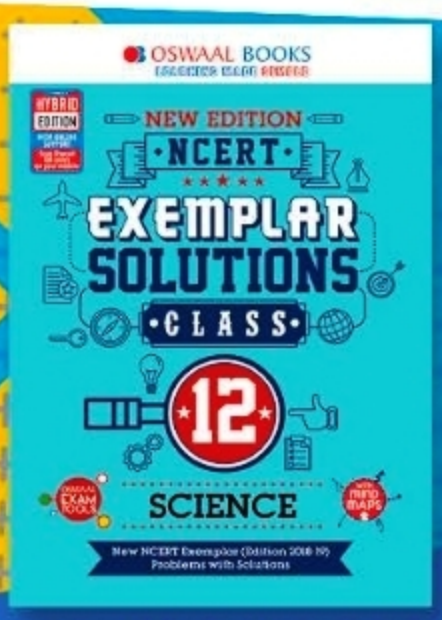

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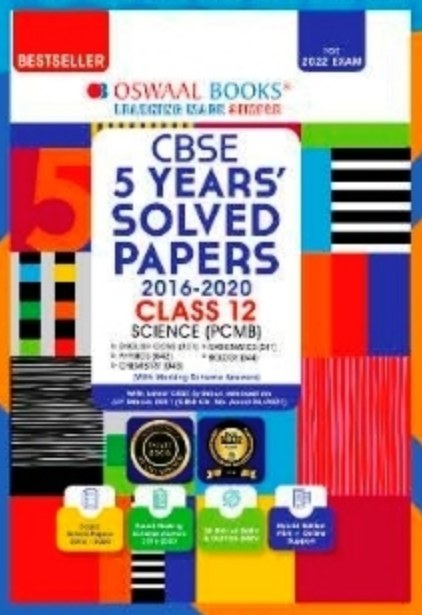

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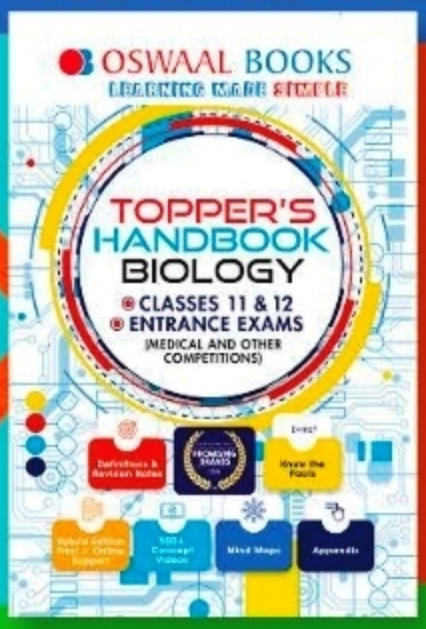

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