Computer: A Wonder Machine
BOOK 8

Chapter 1
Computer Network

1. Answer the following questions:

(a) Computer Network is basically referred to as a group of computers and devices connected to each other with different communication channels. The purpose of computer network is to communicate among users and also allow them to share information, data and resources.

Computer Network has many advantages. It is widely used in today's world and provides multiple benefits to the people using it. Some of them are listed below:

(i) **Communication:** Using a network, we can communicate efficiently and easily through email, instant messaging, chat rooms, telephone, video telephone calls and video conferencing. We can exchange information and data quickly.

(ii) **Sharing Hardware Resources:** In a networked environment, the users are enabled to share various expensive devices. Each computer on a network may access and use hardware resources like printers and scanners attached to a network. This reduces the expenditure as many users can share these devices.

(iii) **Sharing Files, Data and Information:** In a networked environment, the users may access data and information stored on other computers on the network. This is only possible if the users have been authorised to access this data. For example, railway tickets are issued by railway employees all over the country by accessing the centralised railway database. This avoids duplication of data and also keeps the data secure. The capability of providing access to data and information on shared storage devices is an important feature of many networks.

(iv) **Sharing Software:** We can share software and can run programs on the network. We can also install software from other machines on the network.

(b) Every network includes:

(i) At least two computers, *i.e.*, Servers or Client workstations.

(ii) **Network Interface Card (NIC):** The NIC joins the computer to the network allowing it to communicate with other computers on the network.

(iii) A connection medium, usually a wire or cable, although wireless communication between networked computers and peripherals is also possible.

(iv) Network devices like Bridges, Routers, Hubs and Switches are also required for performing the function of joining smaller networks to create a larger network.

(v) Network Operating System software, such as Microsoft Windows 10 or NT or 2000, Novell NetWare, Unix and Linux.

(c) Computer networks are classified on the basis of the following different categories:

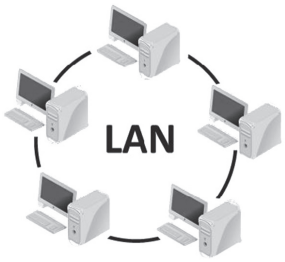
(i) Area covered by the network

(ii) Network Architecture/Design

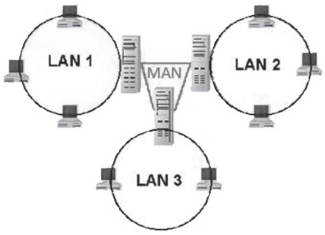
(iii) Network Layout/Topology

(iv) Medium used for networking

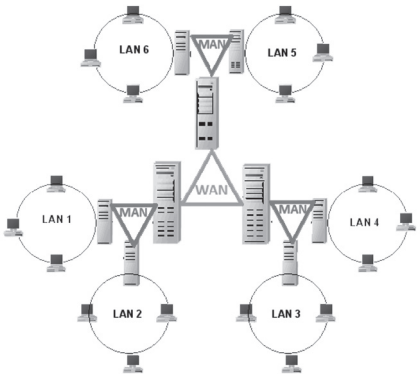
(d) (i) **Local Area Network (LAN):** As the name suggests, this type of network is usually confined to a geographical area, such as a single building or a school. LANs can be small, linking as few as three computers but often link hundreds of computers used by thousands of people. Your school lab is a perfect example of LAN.



(ii) **Metropolitan Area Network (MAN):** When two or more LANs are connected to each other, they form a network. This network is confined to a city or a metropolitan area. Delhi Metro network and ATM network of any area are examples of MAN.

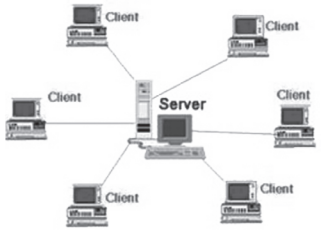


(iii) **Wide Area Network (WAN):** A WAN spans a large geographical area, such as a state, province or a country. WANs often connect multiple smaller networks, such as Local Area Networks (LANs) or Metropolitan Area Networks (MANs).

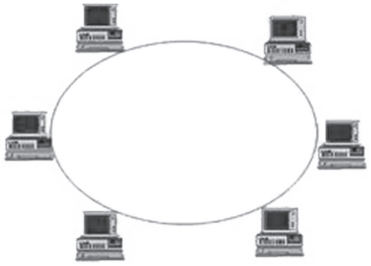


(iv) **Client/Server Networks:** Client/ Server model is the most efficient network. It is also known as distributed application structure. In this network, there is a centralized powerful computer known as server and all other computers or nodes or workstations which are connected

to this server are known as client/ clients. A server machine is a host that is running one or more server programs which share their resources with clients. A client does not share any of its resources but requests a server's content.



(v) **Peer-to-Peer Networks:** In peer-to-peer networking, there are neither dedicated servers nor is there a hierarchy among the computers. All the computers are equal and are, therefore, known as peers. Normally, each computer serves as client/server and there is no one responsible for the entire network.



(vi) **Personal Area Network (PAN):** A Personal Area Network (PAN) refers to the interconnection of information technology devices or gadgets within the environment of an individual user. These interconnected devices might include laptops, PDAs, cellphones, printers, PCs or other wearable computer devices.

(e) Topology means the arrangement of computers in a network. Five basic topologies are used for arranging the computers in a network. These are:

(i) **Bus Topology:** In bus topology, a single cable, also known as backbone, carries all the data. All the computers and other peripherals are connected to this backbone cable. This kind of topology is used for small networks. The amount of cabling is also quite less. The entire network is dependent on the single backbone cable.

(ii) **Star Topology:** In star topology, all the computers are connected to one single central device known as a Hub. The hub could be a computer hub or sometimes just a switch. The hub controls the function of this network. Any information which has to be transferred from one computer to another has to pass through the central hub. This type of network is easy to set up, but if the central connection point fails, the entire network stops working. However, when there is a failure in cable, then only one computer gets affected and not the entire network.

(iii) **Ring Topology:** A ring topology is a network topology or an arrangement in which each network, device or a computer is attached along the same signal path to two other devices, forming a path in the shape of a ring.

Each device in the network handles every message that flows through the ring. Each device in the ring has a unique address. Since there is only one pathway in a ring topology, ring networks are generally disrupted by the failure of a single link.

(iv) **Tree Topology:** Among all the network topologies, the tree topology is said to be a combination of the bus and the star topologies. The tree-like structure allows us to have many servers on the network and we can branch out the network in many ways. A tree structure suits best when the network is widely spread and vastly divided into many branches. A tree network may not suit small networks as it may be a waste of cable.

(v) **Mesh Topology:** Mesh topology works on the concept of routes. In mesh topology, message sent to the destination can take any possible shortest, easiest route to reach its destination. Unlike topologies like star and bus, messages are usually broadcast to every computer. Similarly, in the ring topology, message can travel in only one direction. Internet uses the mesh topology and the message finds its route to its destination.

(f) Computer network find its application in various fields. Some of them are listed here:

(i) Emails are messages distributed by electronic means from one computer user to one or more recipients via a network.

(ii) Searchable Data (Websites) is a location connected to the internet that maintains one or more web pages. These can be accessed using a network.

(iii) File Sharing is the practice of making computer files available to other users of a network, for example, sharing of music and video through internet.

(iv) Printer Sharing is the process of allowing multiple computers and devices connected to the same network to access one or more printers.

(v) E-Commerce or Electronic Commerce, is the trading or facilitation of trading in products or services using computer networks, such as the internet or online social networks.

(vi) News Groups are internet-based discussion groups which discuss a particular topic.

(vii) Internet Telephony (VoIP or Voice over Internet Protocol) is a methodology and group of technologies for the delivery of voice communications and multimedia sessions over computer network such as the internet.

(viii) Videoconferencing means to conduct a conference between two or more participants at different sites by using computer networks to transmit audio and video data.

(ix) Chat Groups are groups of people who exchange messages online, especially people who share a common interest.

(g) **(i) Hub**

- A hub works in the physical layer.
- It is a non-intelligent device and has no decision-making capability.
- Hub takes the input data from one of the ports and broadcasts the information to all the other ports connected to the network.
- Only one transmission takes place on a network at a particular time.

(ii) Switch

- A switch is an intelligent device that works in the data link layer.
- The term intelligent refers to the decision-making capacity of the switch.
- It has knowledge of the machine addresses of the ports in the network.
- It is a secure device because it sends information from sender machine to the receiver machine. It establishes a link between the sender and the receiver based on the machine addresses.

(iii) Repeaters

- A repeater works in the physical layer.
- It is used in places where amplification of input signal is necessary.
- It regenerates the input signal and amplifies only the desirable signal. Hence, the noise component of the signal is eliminated.
- It is necessary during the transmission of the signals over long distances, as the signal decreases and unnecessary noise disturbance is added, which leads in the loss of data. Hence, in order to prevent this, repeaters are used.

(iv) Bluetooth

- It is used to exchange data over a short distance from fixed or mobile devices.
- It helps in building Personal Area Network (PAN).
- It is useful when transferring information between two or more devices that are near each other in low-bandwidth situations.
- Bluetooth exists in many devices such as telephone, tablets, laptops, watches, etc.

(v) GPS

- The Global Positioning System (GPS) is a satellite-based navigation system.
- It is made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense.
- These satellites rotate around the earth. The orbits are arranged so that at any time, anywhere on Earth, there are at least four satellites "visible" in the sky. The GPS receiver locates these satellites and with some mathematical calculations the location is detected.
- GPS is used for tracking in mobiles, cars, etc.

2. Differentiate between:

(a) LAN and WAN

A LAN network is confined to a geographical area, such as a single building or a school.	A WAN spans a large geographical area, such as a state, province or a country.
LANs can be small, linking as few as three computers, but often link hundreds of computers used by thousands of people.	WANs often connect multiple smaller networks, such as Local Area Networks (LANs) or Metropolitan Area Networks (MANs).

(b) Client/Server network and Peer-to-Peer network

In Client/Server networking, there is a centralized powerful computer known as server and all other computers or nodes or workstations which are connected to this server are known as client/clients.	In peer-to-peer networking, there are neither dedicated servers nor is there a hierarchy among the computers.
A server machine is a host that is running one or more server programs which share their resources with clients.	All the computers are equal and are, therefore, known as peers.
A client does not share any of its resources but requests a server's content.	Normally, each computer serves as a client/server and there is no one responsible for the entire network.
Therefore, a server controls this type of network. This type of network is very expensive to set up.	This architecture is better for smaller networks and is inexpensive to set up and maintain.

(c) Star topology and Ring topology

In star topology, all the computers are connected to one single central device known as a Hub. The hub could be a computer hub or sometimes just a switch.	A ring topology is a network topology or an arrangement in which each network device or a computer is attached along the same signal path to two other devices, forming a path in the shape of a ring.
The hub controls the function of this network.	Each device in the network handles every message that flows through the ring.
Any information which has to be transferred from one computer to another has to pass through the central hub.	Each device in the ring has a unique address.

This type of network is easy to set up, but if the central connection point fails, the entire network stops working. But when there is a failure in cable, then only one computer might get affected and not the entire network.	Since there is only one pathway in a ring topology, ring networks are generally disrupted by the failure of a single link.

(d) Wi-Fi and Bluetooth

Wi-Fi means Wireless Fidelity. Wi-Fi can also be called as WLAN (Wireless Local Area Network).	Used to exchange data over a short distance from fixed or mobile devices.
Wi-Fi Network connects computers to each other, to the internet and to the wired network.	It helps in building Personal Area Network (PAN).
Devices which can use Wi-Fi technology include personal computers, video-game consoles, smartphones, digital cameras, tablets, digital audio players and modern printers.	It is useful when transferring information between two or more devices that are near each other in low-bandwidth situations.
Wi-Fi hotspot is created and then the Wi-Fi enabled devices can connect to the network wirelessly.	Bluetooth exists in many devices such as telephones, tablets, laptops, watches, etc.

(e) Switch and Repeater

A switch is an intelligent device that works in the data link layer.	A repeater works in the physical layer.
The term intelligent refers to the decision-making capacity of the switch.	It is used in places where amplification of input signal is necessary.
It has knowledge of the machine addresses of the ports in the network.	It regenerates the input signal and amplifies only the desirable signal. Hence, the noise component of the signal is eliminated.
It is a secure device because it sends information from sender machine to the receiver machine. It establishes a link between the sender and the receiver based on the machine addresses.	It is necessary during the transmission of the signals over long distances, as the signal decreases and unnecessary noise disturbance is added which leads in the loss of data. Hence, in order to prevent this, repeaters are used.

3. Fill in the blanks:

(a) Network Interface Card

(b) Bridges, Routers, Hubs, Switches

(c) Personal Area Network (PAN), Local Area Network (LAN), Metropolitan Area Network (MAN) and Wide Area Network (WAN)

(d) Internet

(e) MAN

(f) Hub

(g) Distributed application structure

(h) Server

(i) Tree

(j) Twisted pair cable, Coaxial cable and Fibre optic cable

4. Match the following:

(a) (viii) Local Area Network

(b) (vii) Metropolitan Area Network

(c) (vi) Wide Area Network

(d) (iii) Networking Interface Card

(e) (ii) Hub

(f) (iv) Centralized powerful computer

(g) (ix) Single backbone cable

(h) (x) Combination of bus and star topologies

(i) (i) Message takes shortest route to reach destination

(j) (v) Transmit radio waves and microwaves

5. Write T for true and F for false statements:

(a) T (b) T (c) F (d) F (e) F

(f) T (g) F (h) T (i) F (j) T

6. Tick (✓) the correct option:

(a) (ii) Bus topology

(b) (iii) Mesh topology

(c) (iv) Server

(d) (i) Hub/Switch

(e) (iv) Modem

(f) (iv) All of these including the network devices

(g) (ii) Client/Server

(h) (ii) LAN

(i) (ii) shortest

(j) (iv) Bus and star topologies

Chapter 2
More on HTML

1. Answer the following questions:

(a) HTML programming follows a standard structure as given below:

```
<HTML>
        <HEAD>
            <TITLE>
            <!—Window title is written here-->
            </TITLE>
        </HEAD>
        <BODY>
        <!—Page content is written here-->
        </BODY>
</HTML>
```

Each HTML program should have the following tags:

- **<HTML> ... </HTML>:** <HTML> tag helps the browser to know that the HTML code starts from here and </HTML> tag tells the browser that the HTML code ends here in the program.
- **<HEAD> ... </HEAD>:** This indicates the first part in HTML code. It contains the title tag.
- **<TITLE> ... </TITLE>:** Title of the page is written here which gets displayed on the title bar of the window.
- **<BODY> ... </BODY>:** This is the main part of our HTML document. The contents of the page are written within this tag.

(b) HTML allows creation of hyperlinks in web pages. The tag that is used in linking is <A>, which stands for Anchor. Anchor tag has two attributes:

(i) Hyper Text Reference (Href) attribute

(ii) Name attribute.

The Image tag defines an image in an HTML page. The <img> tag requires two attributes:

(i) src (ii) alt

(c) (i) Creating a Horizontal Line: <HR> tag

(ii) Creating an Ordered List: <OL> tag

(iii) Creating a Bulleted List: <UL> tag

(iv) Creating Scrolling text: <MARQUEE> tag

(v) Displaying an image on the HTML page: <img> tag

(d) Uniform Resource Locator (URL) locates the linked document and then loads it in IE. URL can locate files on local machine or on any other machine on the internet. URL is the global address of documents and other resources (like images, executable files, etc.) on the World Wide Web. The first part of the address indicates what protocol to use, and the second part specifies the IP address or the domain name where the document or the resource is located.

Syntax of URL: protocol://domain-name/path/filename

Example: http://www.google.com

(e) (i) Nested list—Here is the code for nested list:

----------Code----------

```
<HTML>
    <HEAD>
    <TITLE>
    </TITLE>
    </HEAD>
<BODY>
    <UL>
            <LI> Outdoor Games:
    <UL>
            <LI> Football
            <LI> Cricket
    </UL>
            <LI>Indoor Games
    <UL>
            <LI> Chess
            <LI> Board and Table games
    </UL>
    </UL>
</BODY>
</HTML>
```

(ii) Definition list—Here is the code for definition list:

----------Code----------

```
<HTML>
<HEAD>
<TITLE>
</TITLE>
```

```
</HEAD>
<BODY>
<DL>
<B><DT>The Present Tense </B>
<DD>The verb that refers to the present time is said to be in the present tense.
<B><DT>The Past Tense</B>
<DD>The verb that refers to the past time is in the Past Tense.
<B><DT>The Future Tense</B>
<DD>The verb that refers to the future time is in the Future Tense.
</DL>
</BODY>
</HTML>
```

(iii) Table with three rows and two columns—Here is the code for a table:

----------Code----------

```
<HTML>
    <HEAD>
        <TITLE>
        Table
        </TITLE>
    </HEAD>
    <BODY>
    <!--Table STARTS HERE-->
    <TABLE BORDER = 4>
        <TR>
            <TD> Cell1 </TD>
            <TD> Cell2 </TD>
        </TR>
        <TR>
            <TD> Cell3 </TD>
            <TD> Cell4 </TD>
        </TR>
        <TR>
            <TD> Cell5 </TD>
            <TD> Cell6 </TD>
```

```
                    </TR>
  </TABLE>
  </BODY>
</HTML>
```

---

2. Match the following:

(a) (iv) <Hy>...</Hy>

(b) (x) <HR >...</HR>

(c) (vi) From data appended to URL

(d) (i) <MARQUEE>...</MARQUEE>

(e) (viii) <UL>...</UL>

(f) (v) <OL>...</OL>

(g) (ix) <DL>...</DL>

(h) (ii) <DT>...</DT>

(i) (vii) Uniform Resource Locator

(j) (iii) Hypertext link

3. Fill in the blanks:

(a) Hyper Text Markup Language

(b) Hyperlinks

(c) Anchor <A> tag

(d) <LI>, <DD> and <DT>

(e) Hyper Text Reference

(f) Bulleted list

(g) Hypertext links

(h) Controls

(i) Name

(j) Uniform Resource Locator

4. Write T for true and F for false statements:

(a) F (b) T (c) T (d) F (e) T

(f) F (g) T (h) F (i) T (j) T

5. Tick (✓) the correct option:

(a) (i) <BODY> tag

(b) (ii) FORM (name method action)... (form)

(c) (iv)

(d) (i) 6

(e) (ii) <TD>…</TD>

(f) (ii) <LI>

(g) (iii) <MARQUEE>

(h) (ii) Horizontal

(i) (iv) <LI>

(j) (iv) Submit

Chapter 3
Computer Virus

1. Answer the following questions:

(a) **Viruses:** Malicious computer programs are called computer viruses. These programs do devastating jobs like stall computers, delete data from hard disk, choke networks, send endless emails and hog computer resources like memory or processor time. This way, these programs interfere in normal working of computers and create havoc in the lives of computer users.

Malware: These are the software programs that get installed in our machine and perform unwanted tasks, mainly for the benefit of some third parties. Malware are designed in such a way that they gather information from our computer and pass it on to third parties. They can misuse that information and cause harm.

(b) A virus is designed to run before the actual program runs. First the virus loads itself into memory. Then it finds other executable programs and infects them by modifying the executable program code. Then, when the infected executable programs run, the virus again does the same and the cycle continues. If the infected programs are copied on a compact disk (CD) or a flash drive and the CD or the flash drive is used in another computer, then it infects the other computer as well. This is how the virus spreads. The spreading part is called the infection phase of the virus.

(c) We can prevent our computers from viruses by following a few simple steps:

(i) If there is a choice of operating system, then go for UNIX or similar operating systems which are not prone to virus attacks.

(ii) Do not open and execute email attachments unless you are sure of the origin of the email and the attachment.

(iii) Avoid registering on unnecessary sites on the internet. Surf on the internet for learning needs and not for fun.

(iv) It is good to buy an antivirus software and install it on the computer. We should also update regularly.

(v) Do not run macro unless sure of the task they perform.

(vi) CDs and pen drives should be scanned before copying data to or from them.

(d) Antivirus is a program which performs the following actions to remove malware infections on an individual computer system:

(i) Prevent (ii) Search for

(iii) Detect (iv) Remediate

These tools are critical for us because a computer without an up-to-date antivirus software gets infected within minutes of connecting to the internet. Antivirus performs the following functions:

(i) It scans the files and folders for any malware present.

(ii) We can either schedule automatic computer scanning or can initiate scanning of our files and folders at any point of time using antivirus.

(iii) It removes malicious code detected in our computer.

(iv) It also shows security status of our computer.

(e) As virus is a software code, hence, it is created by a programmer. Software professionals are the people who know programming languages and are programmers. So a programmer writes a malicious code.

(f) Viruses cause huge loss to people who are affected by them. Imagine these situations:

(i) If our hard disk gets formatted due to a virus attack and we lose all our data.

(ii) If a bank where our parents save their money gets infected and loses all its data, then think of the kind of loss the bank and we will suffer.

(iii) If railways or airlines reservation computers lose their data, then the kind of havoc and loss this can create is unimaginable.

(iv) Unauthorized persons can access important and confidential data.

(v) Computers can be hacked to display more advertisements.

2. Match the following:

(a) (vii) Infects Computers

(b) (ix) Infects people

(c) (v) Infection phase

(d) (viii) Attack phase

(e) (i) Example of email virus

(f) (iii) Example of worm

(g) (x) OS not prone to virus attacks

(h) (ii) Virus prevention software

(i) (vi) Attack on My SQL server software

(j) (iv) Attacks at the time when computer boots

3. Fill in the blanks:

(a) Virus
(b) Executable virus
(c) Boot sector virus
(d) Trojan horse
(e) Worm
(f) SQL server slammer
(g) Programmer
(h) Unix
(i) Email
(j) Infection

4. Write T for true and F for false statements:

(a) F (b) T (c) F (d) T (e) T
(f) F (g) F (h) T (i) F (j) T

5. Tick (✓) the correct option:

(a) (i) Avoiding registering on unnecessary sites on the internet
(b) (iv) Damage to cables
(c) (ii) Dengue
(d) (iii) Trojan horse
(e) (iv) All of these
(f) (i) Mydoom
(g) (iii) Needing a medium like air, water, physical contact to get transmitted, etc.
(h) (iv) Infecting computers
(i) (ii) abnormally
(j) (iv) Virus software

Chapter 4
App Development

1. Answer the following questions:

(a) Applications are the small software programs which run on our mobile phones, computers, tablets, etc. They are designed to perform specific tasks, functions or activities which are useful for us. Some of the commonly-used applications are word processor, spreadsheet, web browser, gaming console, etc. Some of the important features of an application software are:

(i) User-friendly
(ii) Easy to design
(iii) More interactive
(iv) Easy to understand

(b) Applications are used everywhere nowadays. Everyone is using applications in one form or another. These applications are installed on computers, mobiles, tablets, etc. Application software can be used:

(i) As a productivity tool

(ii) As a business tool

(iii) To assist graphic projects

(iv) To assist multimedia projects

(v) To provide support at home

(vi) To provide support in educational activities

(vii) To provide support in personal activities

(viii) To assist in communication

(c) There are three main types of applications:

(i) **Desktop:** The applications that run on standalone machines are termed as desktop applications. Therefore, we can define desktop applications as the applications that can be installed on a single computer and perform a specific task.

(ii) **Web-based:** Applications that run with the user's web browser are considered as web applications. With the introduction of internet and online commerce, web application development has gained importance. Online shopping cart on an e-commerce website is considered as an example of web application.

(iii) **Mobile:** A software application that runs on a smartphone, tablet or other portable device is called mobile application. Mobile applications help us by connecting to the internet services. The mobile application software helps us by making it easier to use the internet on our portable devices.

(d) Web/Mobile applications are better than desktop applications because of the following reasons:

(i) Applications need to be installed only once.

(ii) They can be accessed from any location through the internet.

(iii) Easy portability and better functions from usability point of view.

(e) Before developing an application, we should keep the following points in mind:

(i) **Uniqueness:** The idea should be unique. It should be one of its kind.

(ii) **User-friendly:** The application should be user-friendly and easy to use.

(iii) **Rich Features:** Features are very important part of an application. Our application should contain all the relevant features.

(iv) **Flawless Coding:** Application development is done in a particular programming language. Therefore, coding done should be flawless, well-commented and easy to maintain. The programs should be error-free, *i.e.*, application should be tested thoroughly before releasing to the user.

(v) **Powerful Marketing:** In today's world, advertising about our application is very important. If the users do not know about our application, they will not use it. Advertising can be done through various marketing channels like social media, email marketing, newspapers, newsletters, etc.

2. Fill in the blanks:

(a) Desktop application

(b) Mobile application

(c) Word processor or Media player

(d) Mobile application

(e) App

(f) Word processor

(g) Tabular

(h) Tables, Queries, Reports

(i) Internet

(j) App stores, Google Play

3. Place the apps under correct column:

Desktop apps	Web-based apps	Mobile apps
Word Excel Access	Web browser Gmail Amazon app Naukri.com	Gmail for mobile WhatsApp Nova launcher Fifa 17 mobile Uber Amazon app

4. Write T for true and F for false statements:

(a) F (b) T (c) F (d) F (e) T

(f) F (g) F (h) T (i) T (j) F

5. Tick (✓) the correct option:

(a) (iii) Web browser

(b) (ii) WhatsApp

(c) (ii) Videoconferencing

(d) (iv) Laptop

(e) (ii) Standalone

(f) (i) Portability

(g) (iii) Unique

(h) (ii) Marketing

(i) (iv) All of these

(j) (i) Word processor

Chapter 5
Decision-Making and Loops in Python

1. Answer the following questions:

(a) Whenever we build an application in any programming language, there is a need for including decision control statements in code. We can include various conditions in our program using these statements. We can perform different tasks based on the conditions. This helps us to solve the problem. Thus, decision-making involves choosing between possible solutions to a problem.

(b) Syntax for the following statements:

(i) if

```
Syntax: if expression:
            statements
```

(ii) if…else

```
Syntax: if expression:
            Statements
        else
            Statements
```

(iii) elif

```
Syntax: if expression 1:
            Statements
        elif expression 2:
            Statements
        elif expression 3:
            Statements
        else:
            Statements
```

(iv) shorthand if

```
Syntax:
        if expression: Statements
```

(v) shorthand if…else

```
Syntax:
        Statements if expression else Statements
```

(vi) nested if

```
Syntax:
        if expression 1:
```

```
Statements
if expression 2:
        Statements
elif expression 3:
        Statements
else:
        Statements
else:
        Statements
```

(c) The following loops are explained as:

(i) **For Loop:** In Python, *for* loop is used to iterate over the sequence of items. All the items in a sequence are assigned to the iterating variable and the code within the *for* loop is executed. Once all the items of the sequence are assigned, the control moves to the next line of code.

For example:

```
# y is an iterating variable
games = ["Football", "Cricket", "Table tennis", "Lawn tennis", "Badminton"]
for y in games:
        print y
```

(ii) **While Loop:** The statements within the loop get executed repeatedly till the condition is true.

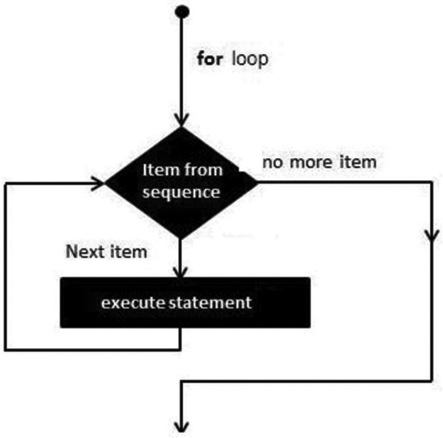
When the condition becomes false, the control moves to the next line. In *while* loop, we require a variable which is also known as indexing variable. We should keep on incrementing as the control executes the code within the block. Before starting the loop, we should set the value of the indexing variable to 1.

For example:

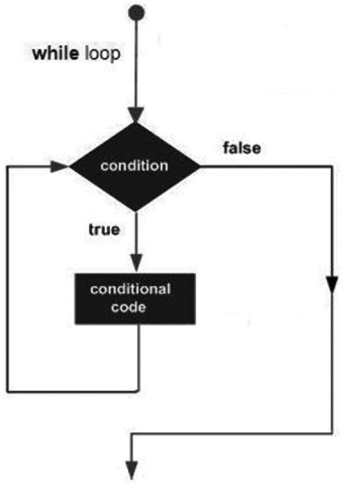
```
count = 5
while count > 0:
        print ("Welcome")
        count – = 1
else:
        print ("Exiting the while loop")
```

2. Fill in the blanks:

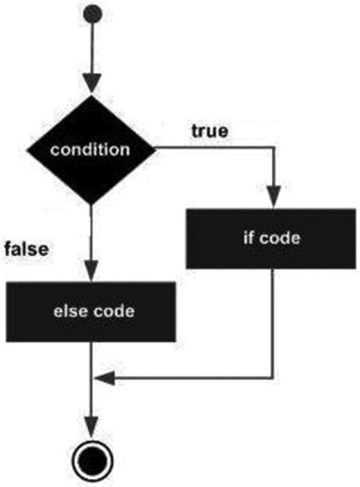
(a) for loop



(b) while loop



(c) if...else



3. Tick (✓) the correct option:

(a) (iv) All of these
(b) (ii) True
(c) (iv) Message displaying "Invalid syntax"
(d) (ii) Expected an indented block
(e) (ii) a and b are equal
(f) (iii) shorthand if…else statement
(g) (ii) nested
(h) (iii) elif
(i) (ii) single
(j) (iii) incremental

5. Machine Room Exercise:

Number1 = 20, Number2 = 40, i = 1,
games = ("football", "cricket", "badminton", "squash")

(i)
```
count = 10
while count > 0 :
        print ("Bob")
        count – = 1
```

(ii)
```
# y is an iterating variable
games = ["football", "cricket", "tennis", "squash", "badminton"]
for y in games:
print y
```

(iii)
```
number = 5
sum = 0
i = 1
while (i<=number):
   sum = sum + i
   i = i + 1
print (sum)
```

(iv)
```
Number1 = 20
Number2 = 40
if (Number1 == Number2):
  print("Number1 is equal to Number2")
elif (Number1 > Number2):
  print("Number1 is greater than Number2")
elif (Number1 < Number2):
  print("Number1 is smaller than Number2")
```

(v)
```
for x in "badminton":
  print(x)
```

(vi)
```
Number1 = 20
Number2 = 40
if (Number2 > Number1 and Number2 > 15 and Number2 > 10):
  print("Number2 is greater than Number1")
else:
  print ("Number2 is smaller than Number1")
```

Chapter 6
Python Functions

1. Answer the following questions:

(a) Python allows us to use functions in our programming. Functions help us to break our program into smaller pieces or modules. As our program grows larger and larger, functions make it more organized and manageable. This is the reason Python is also known as modular programming language.

(b) Python function consists of the following components:

(i) **def** is the keyword used to mark the start of function header.

(ii) A function name should be unique and easy to correlate with the task it will perform.

(iii) Parameters (arguments) through which we pass values to a function.

(iv) A colon (:) is used to mark the end of function header.

(v) In the function body we write the Python statements.

(c) Creating a function involves two steps:

(i) **Defining a function:** Let us take an example where we greet a person.

```
def greet(name):
      print("Hello," + name + "Good morning!")
```

Here,

def is the keyword,

greet is the name of the function,

name is the parameter which we will pass to the greet function at the time of calling it.

(ii) **Calling a function:** After defining a function, we can call it from another function, from another program, or from the command prompt. For calling a function, we type the function name and pass the parameters. In the above example for calling a greet function we simply type:

```
greet ('Bob')
```

Bob is the name parameter which we are passing to the function greet.

(d) We enjoy programming when a user can provide the input to the program. This makes our program interactive. In Python, we can use an in-built function named Input to get the user input.

(e) There are two types of functions in Python:

(i) **Built-in Functions:** Functions that already exist in Python. print() function is the most important built-in function of Python.

(ii) **User-defined Functions:** Functions defined by the users at the time of programming.

2. Fill in the blanks:

(a) User-defined

(b) Built-in functions

(c) Input()

(d) Parameters

(e) Creating a function involves two steps:

(i) Defining a function

(ii) Calling a function by passing the parameters

(f) User-defined functions

(g) def

(h) Unique and easy to correlate.

(i) Modules

(j) Colon (:)

3. Tick (✓) the correct option:

(a) (i) modules

(b) (iii) def

(c) (i) :

(d) (i) arguments

(e) (iii) Defining

(f) (iv) All of these

(g) (iii) both print() and input()

(h) (i) input()

(i) (iv) User-defined

(j) (iv) All of these

4. Activity

(a) (ii) Python is awesome.

(b) (ii) Hello Frodo

(c) (i) b is greater than a

(d) (ii) B

5. Machine Room Exercise

(a)
```
name = input("Enter your name")
print ('Hello,',name,'welcome to class VIII.')
```

(b)
```
def add(x, y):
    return x + y
num1 = int(input('Enter first number:'))
num2 = int(input("Enter second number:"))
print(num1, "+", num2,"=", add(num1,num2))
```

(c)
```
number = 5
sum = 0
i = 1
while (i<=number):
  sum = sum +i
  i = i + 1
print (sum)
```

(d)
```
----------Code----------
# Python program to find the largest number among the three input numbers
# take three numbers from user
num1 = int(input("Enter first number: "))
num2 = int(input("Enter second number: "))
num3 = int(input("Enter third number: "))

if (num1 > num2) and (num1 > num3):
      largest = num1
elif (num2 > num1) and (num2 > num3):
      largest = num2
else:
      largest = num3

print("The largest number is",largest)
------------------------------------------------------------
```

(e)
```
def multiply(x,y):
    return x*y
num1 = int(input("Enter first number:"))
num2 = int(input("Enter second number:"))
print(num1, "*", num2,"=", multiply(num1, num2))
```

Chapter 7
E-Commerce

1. Answer the following:

(a) In the context of e-commerce, 'shopping' involves the experience of browsing, selecting, buying items online and avoiding going from shop to shop spending hours sometimes without geting anything of your choice. The best part of online shopping is that if you are not satisfied with your purchase for some reasons, the item can always be returned within a fixed time period.

(b) E-commerce is divided into three categories:

(i) **Business to Business (B2B):** Where buying and selling is within the business groups. For example, Investopedia.com.

(ii) **Business to Consumer (B2C):** Where buying and selling is between the consumer and the business. For example, Amazon.com, Flipkart.com, etc.

(iii) **Consumer to Consumer (C2C):** Where buying and selling is between the consumers. For example, Quikr.com.

(c) E-Commerce provides the following features:

(i) **Marketing to Target Segments:** Extensive marketing campaigns are run to attract customers to buy products online.

(ii) Allowing consumers to make comparisons and selection.

(iii) Buy online by paying online or on delivery.

(iv) Payment online can be done using credit cards and debit cards.

(v) Payment on delivery can also be done using cash, if the seller permits.

(vi) **24 × 7 Availability:** Online shopping sites are available 24 hours × 7 days a week.

(vii) **Increased Sales:** Online sites are available 24 × 7, allowing people to buy products anytime, anywhere, thus leading to increased sales.

(viii) **Support:** E-Commerce provides various ways to provide pre-sales and post-sales assistance to offer better services to customers.

(ix) **Efficient Inventory Management:** In E-Commerce, inventory management of products is automated and is efficient and easy to maintain.

(x) **Extensive Communication:** In E-commerce, extensive, fast, efficient and reliable communication is done with customers (buyers) and partners (sellers).

(d) (i) **E-commerce:** When we buy from online shopping sites, it is like a simple business transaction, where we become the buyer and the online shopping site becomes the seller. In this case, we are using electronic medium to do business transaction, so it is called electronic commerce or e-commerce.

(ii) **E-shopping:** Shopping virtually on the internet using web browser is known as Electronic Shopping or E-Shopping. A consumer visits various shopping websites in search of the product of interest. Once the product is selected, the consumer orders this product. The ordered product is delivered at the doorstep, thus saving precious time and energy of the buyer.

(iii) **E-ticketing:** E-Ticket or Electronic Ticket is also known as Digital Ticket. It is an effective method of generating tickets. Nowadays airlines, trains, movie halls and some major event organizers offer e-tickets. Like we do online shopping, in the same way we buy online tickets. Without physically visiting the ticket counter, we can book our tickets.

(iv) **E-banking:** E-Banking is also known as electronic banking, online banking or internet banking. It is an electronic banking system which helps bank customers to do financial transactions through the bank websites.

(e) With the growth of internet banking, a lot of security threats like hacking, viruses, grooming, phishing, spam, etc., have come up. For preventing such threats, we need to tackle them by making improvements in the security measures.

Here are some important tips to use internet banking safely:

(i) We should always use genuine antivirus software.

(ii) Avoid using public Wi-Fi.

(iii) Check for latest updates of your Smartphone's operating system.

(iv) Change your password regularly and ensure it's a strong one.

(v) Avoid signing-in to your net-banking account via mailers.

(vi) Do not use public computers to log in to net banking.

(vii) Check account regularly.

2. Match the following:

(a) (iv) Online, real time

(b) (v) One-Time Password

(c) (vi) Digital Ticket

(d) (vii) Done by Credit Card

(e) (viii) Done by Cash

(f) (ix) C2C

(g) (x) B2B

(h) (i) B2C

(i) (iii) Computer, Network and Servers

(j) (ii) Electronic information transfer system

3. Fill in the blanks:

(a) electronic medium

(b) Business to Business

(c) websites

(d) picture, description

(e) criminals

(f) Digital ticket

(g) Email, SMS alerts

4. Write T for true and F for false statements:

(a) T (b) T (c) T (d) F (e) F

5. Tick (✓) the correct option:

(a) (iv) Credit Card

(b) (ii) B2C

(c) (ii) 24×7

(d) (iv) All of these

(e) (i) Virtual shopping

(f) (iii) Pre-sales and post-sales assistance

(g) (iv) All of these

(h) (iv) Investment

(i) (ii) Financial transactions

Chapter 8
Ethics and Safety Measures in Computing

1. Answer the following questions:

(a) The Internet is a huge network of computers which links many different types of computers all over the world. It is a network of networks. It follows some common set of protocols for communication between computers on the network.

(b) Advantages of Internet:

(i) **Unlimited Communications:** The Internet has made it easy for people to communicate with others because it is cheap and convenient. The only thing required is an internet connection.

If we want to talk to someone who is in another part of the world, we can just log in with Skype or any other communication application and do a video chat.

(ii) **Plenty of Information and Resources:** The internet is full of information about anything and everything. With the help of web browsers, we can search for information easily. We can research and also read the latest news. We can access information on the internet from anywhere in the world.

(iii) **Easy Sharing:** Sharing information is very fast on the internet. We can share videos, pictures, music, important documents, etc. Social media sites like Facebook, Twitter, Instagram, WhatsApp, etc., play an important role in sharing files on the internet.

(iv) **Online Services and E-commerce:** Internet has provided a platform for buying and selling of goods, without physically visiting the shop. We can do our financial transactions online. We can now book our movie tickets, pay our electricity bills and even pay taxes. This is all possible because of internet.

(v) **Entertainment:** Internet helps us to watch movies, listen to music, read our favourite celebrity gossip columns and play games online. Most of us surf internet for entertainment.

Disadvantages of Internet:

(i) **Spam and Unwanted Mails:** These are the unwanted and useless mails which are sent to many people randomly. These cause the inbox to be filled unnecessarily. It gets difficult to access the important mails in the inbox.

(ii) **Virus and Other Malware:** These are the malicious programs which are present on the internet. As soon as we connect our machine to the internet, these programs enter our machines. They make our computer malfunction, causes data loss, memory loss, etc. We can protect ourselves by installing antivirus programs before accessing the internet.

(iii) **Leakage of Personal and Private Information:** Credit card and Debit card information is quite vulnerable on the internet. We provide our information on the internet while doing any transactions online. We should be very careful before providing these details on the internet and should follow the payment process.

(iv) **Addiction to Internet:** People get addicted to the internet very easily. Internet addiction is the major cause of obesity in children these days.

(c) Ethics are the laws defined that govern how to use computers. These are a set of moral principles that regulate the use of computers. The following are the computer ethics followed on the internet:

(i) We should not use computers to harm other people.

(ii) We should not interfere with other people's computer work.

(iii) We should not sneak in other people's computer files.

(iv) We should not copy or use proprietary software for which we have not paid.

(v) We should not use others' computer resources without authorization.

(vi) Before developing a software, we should think about its consequences on the society.

(vii) We should always use a computer in ways that ensure respect and consideration of our fellow humans.

(d) (i) **Plagiarism:** It is often known as stealing or an act of fraud in the computer world. According to the Merriam-Webster Online Dictionary, to "plagiarize" means—

- to steal and pass off (the ideas or words of another) as one's own
- to use (another's production) without crediting the source
- to commit literary theft
- to present as new and original an idea or product derived from an existing source

(ii) **Cyber Bullying:** It is also known as cyber harassment. When a child is bullied, harassed, humiliated, etc., through the internet, any digital technology or mobile phones, it is known as cyber bullying.

(iii) **Phishing:** Phishing is a homophone of 'fishing'. As an angler traps to catch fish while fishing, similarly, phishing is an attempt to obtain sensitive information from us through emails. The attacker tries to get information

such as usernames, passwords and credit card details for malicious reasons. This attachment, if opened, installs malware on our machine or directs us to a website and seeks sensitive information from us.

(iv) **Spamming:** Spamming involves receiving unwanted emails. These emails are used for commercial advertisements. These are also termed as junk mails. The major problem with these junk mails is that they choke the internet and waste a lot of people's time. It is very difficult to stop these spam mails. However, some services are available on the internet which prevent spammers from sending spam mails.

(v) **Software piracy:** The unauthorized copying of software is software piracy. Most of the software comes with a licence. We can buy software, take backup of it and can become a licensed user. However, if we create a copy of it and give it to our friends, then it is against law. Stopping piracy is very difficult although the software companies have taken various measures.

(e) We should be very careful while using internet and follow some safety norms.

(i) **Parental Assistance for minors such as viewing age-appropriate websites:** When kids have unrestricted access to the internet, it is quite possible that they may visit some websites which are not appropriate for them. Parents should monitor their computer use and help them to surf the internet safely. Elders should educate them about misleading materials available on the internet. There are many software available, which help in filtering the unwanted sites. Parents should communicate with their children about the threats on internet.

(ii) **Not Sharing Passwords:** We should never share our passwords with anyone. Our login id and passwords can be used to assess our emails and personal data. They can even be used to perform some malicious act using our id, and then we will be held responsible for the act. We should never save our login details on the sites as it is the same as sharing passwords with anyone.

(iii) **Frequently Changing Passwords:** Passwords should be changed frequently. Same passwords should not be kept for more than one account. Passwords should not be names of family members as they can be guessed easily. They should contain alphabets, numbers and special characters.

(iv) **Responding Only to Known Persons or Organisations:** We should never open mails from an unknown person as it may contain any malicious code, which can infect our computer. In addition, we should never click on a link that we have no idea about. Responding to such mails might put us into a bigger danger. They can obtain all the information about us through one mail from our computer. They can trap us by building a conversation with us through mails.

(v) **Protection Using Firewall:** Firewall is a network security system designed to prevent unauthorized access to our computer.

2. Fill in the blanks:

(a) Digital footprints
(b) Cyber-vetting
(c) Patent
(d) Spamming
(e) Hacker
(f) Cyber bullying
(g) Virus, malware
(h) internet
(i) E-shopping
(j) Ethics

3. Write T for true and F for false statements:

(a) F (b) T (c) F (d) T (e) T
(f) F (g) F (h) T (i) F (j) T

4. Match the following:

(a) (iv) Facebook
(b) (v) Wikipedia
(c) (vi) Amazon.com
(d) (vii) YouTube
(e) (viii) Virus
(f) (ix) Spam
(g) (x) Moral principles
(h) (ii) Act of fraud
(i) (iii) Cyber harassment
(j) (i) Unauthorized copying

5. Tick (✓) the correct option:

(a) (i) Digital Footprints
(b) (iii) Password
(c) (ii) Intellectual property rights
(d) (iv) Piracy
(e) (ii) Phishing
(f) (iv) All of these
(g) (ii) Leakage of personal and private information
(h) (i) Computer malfunction
(i) (iii) Plagiarism
(j) (ii) Hacker

Chapter 9
Latest Technologies—The Game Changer

1. Answer the following questions:

(a) (i) **Virtual Reality:** Virtual Reality or VR is a simulated 3D digital world that we can explore in the form of videos, games or simulation systems. We wear a VR headset or head-mounted display to get a 360-degree view of an artificial world that makes our brain believe that we are in a different reality.

(ii) **Extended Reality:** Technologies like virtual reality (VR), augmented reality (AR) and mixed reality (MR) that can create, alter or enhance the perception of reality by using computer-generated simulations, models or environments are collectively known as Extended Reality or XR.

(iii) **Augmented Reality:** Augmented Reality or AR creates connections of digital world in the real world, such as text, images, 3D models or animations. We can access AR through screens, tablets, smartphones or smart glasses. It enhances the real world with digital details that can provide information, entertainment and interactions. For example, Pokémon Go.

(iv) **Mixed Reality:** Mixed Reality or MR is a technology that combines VR and AR to create the real and virtual world in various ways. We need special devices such as Microsoft HoloLens or Magic Leap to experience MR.

(b)

Virtual Reality	Augmented Reality
It creates a completely immersive virtual environment.	It enhances the real-world scene with virtual elements.
We are isolated from the real world and immersed in a fictional one.	We always have a sense of presence in the real world.
VR is 75% virtual and 25% real.	AR is 25% virtual and 75% real.
It fully engages us into action.	It partially engages us into action.
A headset device is needed. It blocks out our vision.	No headset device is needed. It can be accessed with a smartphone or a transparent device.
It enhances the fictional reality for gaming and entertainment.	It enhances both real and virtual worlds.

(c) Virtual Reality is used in the following fields in ways mentioned below:

(i) **Education:** VR can make learning more interactive and effective by allowing us to access information, visualize concepts and practise skills. Some educational VR apps are Google Expeditions, Body VR, etc.

(ii) **Healthcare:** VR improves the healthcare field by enhancing diagnosis, treatment, training and therapy. Some healthcare VR apps are Psious, Virtual Reality Medical Centre, etc.

(iii) **Gaming:** VR can make games more interactive and engaging by allowing us to explore the virtual world or interact with digital characters. Some popular VR games are Half-Life: Alyx2, Beat Saber3, etc.

(iv) **Tourism:** VR can enhance the travel experience by allowing us to visit distant places, learn about cultures and discover new attractions. Some tourism VR apps are Google Earth VR, Ascape VR, etc.

(d) Augmented Reality is used in the following fields in the following ways:

(i) **Education:** AR can make learning more engaging and interactive by providing personalized content. For example, students can explore historical sites, view 3D models of human anatomy, etc.

(ii) **Healthcare:** AR can improve the quality and efficiency of healthcare services by providing accurate and timely information. For example, doctors can use AR to visualize medical images, diagnose diseases or perform surgeries.

(iii) **Gaming:** AR allows us to interact with digital characters and we can also explore the real world. For example, Pokémon Go.

(iv) **Tourism:** AR can enrich the travel experience and cultural awareness by providing more information and interaction. For example, travellers can use AR to navigate unfamiliar places, learn about local history, discover hidden attractions, etc.

(e) The differences between Virtual, Augmented and Mixed Reality are:

Virtual reality (VR) creates a completely immersive virtual environment that replaces the real world. We are isolated from the real world and immersed in a fictional one.

Augmented reality (AR) adds virtual elements to the real world. We have a sense of presence in the real world and can interact with both real and virtual objects.

Mixed reality (MR) combines VR and AR to create an environment where physical and virtual objects can exist and interact in real-time. We can switch between different levels of immersion and interaction.

2. Fill in the blanks:

(a) Virtual, Augmented

(b) Microsoft HoloLens, Magic Leap

(c) 75% and 25%

(d) Augmented Reality

(e) Google Expeditions, Body VR

3. Match the following:

Augmented Reality	**Virtual Reality**
Pokemon Go	Google Expeditions
Harry Potter: Wizards Unite	Ascape
Visualize medical images	Psious
Navigate unfamiliar places	Half-life: Alyx

4. Write T for true and F for false statements:

(a) F (b) F (c) T (d) F (e) T

(f) F (g) T (h) T (i) T (j) F

5. Tick (✓) the correct option:

(a) (ii) Extended Reality

(b) (i) Virtual reality and Augmented reality

(c) (ii) Virtual Reality

(d) (iii) Headset

(e) (i) Smartphone

(f) (iv) All of these

(g) (i) Pokemon Go

(h) (iv) XR

(i) (i) AR

(j) (iv) Glasses

Chapter 10
Increasing Productivity Using Artificial Intelligence

1. Answer the following questions:

(a) AI-powered chatbots are like smart robots that can chat with us. They are created using artificial intelligence. This means they can learn and get better over time, just like how we learn new things in school. Some available chatbots are Chatfuel, Dialogflow, ChatGPT, etc.

(b) The AI tools available in Microsoft Word are:

1. Editor
2. Researcher
3. Ideas
4. Translator
5. Dictation
6. Accessibility Checker
7. Smart Lookup

(c) In Microsoft Word, the Translator tool helps in translating words, phrases or the whole document into another language.

To use Translator, perform the following steps:

(i) Open the Word document we want to translate.

(ii) Click the Review tab on the ribbon.

(iii) Click on the Translate down arrow in the language group

For translating the selection with Microsoft translator, we click on Translate Selection option or choose Translate Document for creating a translated copy of our document with Microsoft Translator.

Translator pane appears on the right side of the document. Here, we can select the required language from the drop-down list. Then, clicking on Translate button translates the document into the selected language.

(d) The Dynamic Arrays feature allows us to write formulas. Press the Enter key to view the displayed array of values is on the sheet. Functions in Excel that use Dynamic Array are:

(a) =UNIQUE

(b) =FILTER

(c) =RANDARRAY

(d) =SEQUENCE

(e) =SORT

(f) =SORTBY

(g) =XLOOKUP

(h) =XMATCH.

(e) With Rehearse with Coach, we can easily rehearse our presentation and get intelligent tips to improve our presentation skills. Here is how you can use it:

(i) Open presentation in PowerPoint.

(ii) Go to the Slide Show tab.

(iii) Click on Rehearse with Coach in the Rehearse section of the ribbon.

(iv) Click on Start Rehearsing in the small dialog box that appears.

(v) For feedback, check the box for Show real-time feedback.

(vi) When we present our presentation, the AI coach listens to our presentation and provides online feedback.

2. Fill in the blanks:

(a) PowerPoint Designer theme ideas

(b) dynamic arrays

(c) Editor

(d) Accessibility Checker

(e) Generative Pre-Trained Transformer

3. Match the following:

(a) (x) Spelling and grammar checker

(b) (iv) Collect the content from the web

(c) (v) Microphone gets activated

(d) (ix) Suggestions to make document accessible

(e) (viii) Write a formula

(f) (iii) Data range gets updated automatically

(g) (vii) Text into formulas

(h) (vi) Rehearse our presentation

(i) (i) Chat Generative Pre-Trained Transformer

(j) (ii) Microsoft Edge

4. Tick (✓) the correct option:

(a) (i) To check grammar and style using AI

(b) (iii) It provides definitions, synonyms and translations of words.

(c) (ii) To generate insights from data

(d) (iii) It automatically fills in values.

(e) (iv) Chat Generative Pre-Trained Transformer

(f) (iii) It provides real-time feedback on presentation skills.

(g) (ii) To provide design suggestions for slides

(h) (iii) Open AI

(i) (ii) It can perform web searches.

(j) (ii) Microsoft

Chapter 11
Artificial Intelligence – Project Life Cycle

1. Answer the following questions:

(a) The most basic and important difference between AI project life cycle and traditional IT project life cycle is that in the case of Artificial Intelligence project life cycle, we provide the result as input and train the AI application accordingly. Data plays an important role in the development of AI applications whereas in traditional IT project life cycle, we identify the need and objective of our project and after that we build an application to obtain the result.

(b) Different phases of traditional IT project life cycle are:

(i) **Initiating**—This is the first phase of a project life cycle. In this phase, we identify the need and objective of our project. Here, in our example, Berry's objective was to bake a cake for her friend.

(ii) **Planning**—The next phase is planning where the project solution is developed in detail. The necessary steps and strategies are planned in order to complete the project. Here, in our example, Berry found the recipe and ingredients required for baking a cake.

(iii) **Executing**—This is also known as the implementation phase. During this phase, the task is performed as per the plan. Program is written for achieving our objective. In our example, the process is followed according to the recipe for baking the cake.

(iv) **Monitoring and Controlling**—Regular monitoring and controlling is required during the execution phase. During the project activities, we can take corrective action if required. In our example, Berry monitored the temperature of the oven and the cake baking process.

(v) **Closing**—It is the last phase, also known as the closure phase. The project has reached its completion and is ready for delivery. In our example, Berry has finished baking the cake and is ready to surprise her friend.

(c) **Problem Scoping**—Scope refers to the combined objectives and requirements needed to complete a project. This stage begins after identifying the problem where we need to understand various factors that affect the problem and set goals that are to be achieved by the project. For scoping the problem in a better and more efficient way, we use the 4W's Canvas. 4W's Canvas is a tool used in defining the scope of the problem in a more structured way.

The 4W's are:

(i) **Who?:** Who refers to the person or group of persons facing the problem that are affected by the problem.

(ii) **What?:** What refers to the exact nature of a problem.

(iii) **Where?:** Where is related to the location or context or situation of a problem.

(iv) **Why?:** Why refers to the reason for solving the problem and the benefits obtained by solving this problem.

(d) (i) **Artificial Intelligence:** Artificial Intelligence is a field that enables computers to perform tasks that require human intelligence. It allows the machines to recognize objects or understand voice commands through voice assistants.

(ii) **Machine Learning:** Machine Learning is a subset of Artificial Intelligence that gives machines the capability to learn from data, identify patterns and make decisions without human involvement.

(iii) **Deep Learning:** Deep Learning is the most advanced field of Artificial Intelligence that mimics the working of the human brain in processing data and creating patterns for decision-making. Deep Learning is a subset of Machine Learning that deals with algorithms inspired by the function of the brain called Artificial Neural Networks.

(e) After analyzing and visualizing the patterns of data in the exploration stage, we create algorithms based on that data, which are also known as models. The process of creating models based on the analyzed data is known as modelling.

We can use pre-built models or algorithms available in different platforms or we can write our own programs. The advantages and disadvantages of the model can also be checked during the process of modelling.

Artificial intelligence has two types of models:

- **Rule-based Models:** In rule-based models, the machine follows the patterns and instructions defined by the developer and performs its task accordingly. Rule-based model works on the concept of a decision tree.
- **Learning-based Models:** In learning-based models, the patterns are not defined by the developers; rather, a huge amount of unlabelled data is fed into the machines. The machine analyzes the data and generates patterns from it. During data analysis, it extracts similar data and tries to learn on its own. Learning-based models are of two types:
  - Machine Learning
  - Deep Learning

2. Fill in the blanks:

(a) Rule-based
(b) Decision tree
(c) Learning based
(d) Machine learning, Deep learning
(e) Evaluation
(f) Artificial Intelligence
(g) Deep Learning
(h) Deep Learning
(i) Data exploration
(j) Machine language

3. Tick the correct option:

(a) (iii) When
(b) (i) Input
(c) (iv) Problem Identification
(d) (ii) Data acquisition
(e) (iii) Artificial Intelligence
(f) (ii) Unlabelled
(g) (i) Evaluation
(h) (iv) Newspaper
(i) (ii) Secondary
(j) (ii) Scope

4. Write T for true and F for false statements:

(a) T (b) F (c) T (d) T (e) F
(f) F (g) T (h) T (i) F (j) T