केन्द्रीय विद्यालय संगठन

KENDRIYA VIDYALAYA SANGATHAN

अध्ययन सामग्री

STUDY MATERIAL

कक्षा ग्यारवी

CLASS XI

इन्फॉर्मैटिक्स प्रैक्टिस

Informatics Practices (065)

2023-24

तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

कोलकाता संभाग

KOLKATA REGION

STUDY MATERIAL FOR CLASS XI
(INFORMATICS PRACTICES)

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Salient features of this Study Material

1. Targeting 100% pass rate.
2. Ensuring a minimum level of learning.
3. Providing support for improving risers and other students of Class XI in the subject of IP (Informatics Practices).
4. Provide an introduction to the chapter, including its relevance and importance.
5. Summarize the key concepts and takeaways from the chapter.
6. Multiple Choice Questions (MCQs):

   Present a set of multiple-choice questions related to the chapter .Include options for each question and provide correct answers .

7. Assertion and Reason-Based Questions:

   Include assertion and reason-based questions to test logical reasoning. and provide correct answers.

8. Questions of 2 Marks (Knowledge/Understanding/Application-Based)

   Create questions related to identifying errors in code or predicting program output and Include model answers.

9. 3 Marks Questions (Knowledge/Understanding/Application-Based):

   Formulate questions requiring a deeper understanding of the chapter.

   Include questions that test the application of concepts and provide model answers.

10. 4 Marks Questions (Knowledge/Understanding/Application-Based):

    Include comprehensive questions combining various aspects of the chapter.

    Cover topics like application, output, errors, and in-depth understanding and provide detailed model answers

11. Case Study-Based Questions:

    Include case study questions that require students to analyse and apply their knowledge to real-world scenarios.Provide model answers or suggested approaches to solving the case studies.

INDEX

Units and Marks

UNIT	UNIT NAME	MARKS
1	Introduction to Computer System	10
2	Introduction to Python	25
3	Database concepts and the Structured Query Language	30
4	Introduction to Emerging Trends	5
5	Practical	30
	TOTAL	100

Syllabus of Class XI IP (2023-2024)

Topics to be-covered	Th.	Pr.
Unit1:Introduction to Computer System • Introduction to computer and computing: evolution of computing devices, components of a Computer System and their inter connections,Input/Output devices. • Computer Memory: Units of memory,types of memory–primary and secondary,data deletion,its recovery and related security concerns. • Software: purpose and types – system and application software, generic and specific purpose software	10	
Unit2:Introduction to Python • Basics of Python programming,Python interpreter-interactive and script mode, the structure of a program, • Indentation,identifiers,keywords,constants,variables,types of operators,precedence of operators,data • Types,mutable and immutable data types, statements,expressions,evaluationand comments, input and output statements, • Data type conversion,debugging. • Control Statements:if-else,**if-elif-else, while loop,**forloop • Lists: list operations-creating,initializing,traversing and manipulating lists,list methods and built-infunctions.– len(),list(),append(),insert(), count(),index(),remove(), pop(), reverse(), sort(), min(),max(),sum() • Dictionary:concept of key-value pair, creating,initializing,traversing,updating and deleting elements,dictionary methods and built-infunctions.– dict(), len(), keys(), values(), items(), update(), del(), clear()	35	28
Unit3:Database concepts and the Structured Query Language • Database Concepts: Introduction to database concepts and its need, Database Management System. • Relational data model: Concept of domain, tuple,relation, candidate key, primary key, alternate key • Data Query: SELECT, FROM, WHERE with relational operators, BETWEEN, logical operators, IS NULL, IS NOT NULL • Data Manipulation: INSERT, DELETE,UPDATE	17	7
Unit4:IntroductiontotheEmergingTrends • Artificial Intelligence, Machine Learning, Natural Language Processing ,Immersive experience(AR,VR),Robotics,Big data and its characteristics, Internet of Things(IoT), Sensors, Smart cities, Cloud Computing and Cloud Services(SaaS, IaaS,PaaS);Grid Computing, Block chain technology	7	

Name of the chapter : **Introduction to Computer System**

Topic Covered

- Introduction to computer and computing: evolution of computing devices, components of a Computer System and their inter connections,Input/Output devices.
- Computer Memory: Units of memory,types of memory–primary and secondary,data deletion,its recovery and related security concerns.
- Software: purpose and types – system and application software, generic and specific purpose software

Key Points

Hardware:-Computer hardware refers to the physical components of a computer system, including the central processing unit (CPU), memory, storage devices, input devices (keyboard, mouse), output devices (monitor, printer), and other peripherals. It encompasses the tangible, electro-mechanical, and electronic elements that constitute a computer and enable its functioning.

Integrated Circuit:An Integrated Circuit (IC) is a compact assembly of interconnected electronic components, such as transistors, resistors, and capacitors, fabricated on a semiconductor substrate. This miniaturized arrangement enables the creation of complex electronic circuits, forming the basis of modern microprocessors, memory chips, and various electronic devices.

Input Devices:Computer input devices are hardware components that allow users to provide data and commands to a computer system. Examples include keyboards for typing, mice for pointing and clicking, and scanners for converting physical documents into digital form. These devices enable users to interact with and input information into the computer.

Output Devices:Computer output devices are hardware components that present or display processed information from a computer to the user. Examples include monitors for visual output, printers for producing hard copies of documents, and speakers for audio output. These devices convey the results of computations and operations performed by the computer.

Central Processing Unit:The Central Processing Unit (CPU) is the primary component of a computer responsible for executing instructions from programs. Acting as the "brain" of the system, it performs arithmetic and logic operations, manages data, and coordinates the functioning of other hardware components, crucial for overall computing functionality and speed. It consists of Arithmetic Logic Unit, Control Unit & Registers

Arithmetic Logic Unit: The Arithmetic Logic Unit (ALU) is a fundamental component of a computer's central processing unit (CPU) responsible for performing arithmetic and logical operations on binary data. It executes tasks like addition, subtraction, AND, OR, and other operations, crucial for processing and manipulating information within the computer system.

Control Unit: The Control Unit is a critical component of a computer's central processing unit (CPU) that manages and coordinates the execution of instructions. It decodes program instructions, directs data flow within the CPU and between other system components, and controls the overall operation of the processor to execute tasks in a programmed sequence.

Memory: Computer memory refers to the electronic components that store data and instructions temporarily or permanently for processing by a computer. It includes RAM (Random Access Memory) for temporary storage and ROM (Read-Only Memory) for permanent storage. Memory is crucial for the execution and retrieval of information during computer operations.

Primary Memory:Primary memory, also known as main memory or RAM (Random Access Memory), is a volatile and fast-access computer storage that temporarily stores data and instructions for the CPU. It plays a critical role in actively running programs and allows quick access to information needed for ongoing computational tasks.

Secondary Memory:Secondary memory refers to non-volatile storage devices in a computer system, such as hard drives, solid-state drives, and external storage. Unlike primary memory (RAM), it retains data even when the power is off. Secondary memory is used for long-term storage of files, applications, and the operating system.

Registers:Memory registers are small, high-speed storage locations within a computer's central processing unit (CPU). They temporarily hold data and instructions that the CPU is actively processing. Registers play a crucial role in facilitating quick access to information and supporting the efficient execution of instructions during program operation.

Cache Memory:Cache Memory is a high-speed volatile computer memory located between the central processing unit (CPU) and main memory. It stores frequently accessed data and instructions to expedite retrieval, enhancing overall system performance by reducing the time it takes for the CPU to access frequently used information during program execution.

System Bus:The System Bus is a communication pathway that connects the major components of a computer system, facilitating data transfer between the central processing unit (CPU), memory, and peripheral devices. It comprises the **address bus**, data bus, and **control bus,** coordinating the flow of information within the computer architecture.

Data Deletion-It is the simple process of deleting a file and placing it into the Recycle Bin or Trash.

Data recovery-It is a process of retrieving deleted, inaccessible, lost, corrupted, damaged, or formatted data from secondary storage/ removable media .

Data security -It is the process of protecting corporate data and preventing data loss through unauthorized access.

Software -It is basically a set of instructions or commands that tell a computer what to do.

System Software-It is a program designed to run a computer's hardware and applications and manage its resources, such as its memory, processors, and devices.

Application Software-It is a type of computer program that performs a specific personal, educational, and business function. **Generic software**- Generic software is a system designed for general public usage. Specific software-It is software that is created for a specific purpose, organization, or individual.	
30 Objective Question (1 Mark)	
Q1.	A computer is a/an ..... device. a) Mechanical b) Electrical c) Electronic d) Telecommunication
Ans	c) Electronic
Q2.	The physical components of the computer are known as a) Software b) Program c) Hardware d) Both A and C
Ans	c) Hardware
Q3.	Which of the following is not related to a personal computer: a) Processor b) Onboard c) Motherboard d) Keyboard
Ans	b) Onboard
Q4.	Which of the following is not a type of computer: a) Smart Phone b) Smart watch c) Biometric d) Tablet PC
Ans	c) Biometric
Q5.	Which type of PC is available in your school computer laboratory? a) IBM PC b) Macbook c) Chrome Book d) Tablet PC
Ans	a) IBM PC

Q6.	Full form of ALU is: a) Abacus Logarithmic Unit b) Arithmetic Logic Unit c) Abacus Language Unit d) Arithmetic Language Unit
Ans	b) Arithmetic Logic Unit
Q7.	Which of the following is a part of ALU? a) Arithmetic Unit b) Control Unit c) Logic Unit d) Both a) and c)
Ans	d) Both a) and c)
Q8.	First binary programmable computer based on Von Neumann architecture is: a) UNIVAC b) EDVAC c) ENIAC d) Mark I
Ans	c) ENIAC
Q9.	Arrange the following in increasing order of no of transistors on a single chip: i) SLSI ii) IC iii) VLSI iv) LSI a) i) SLSI ii) IC iii) VLSI iv) LSI b) ii) IC iii) VLSI iv) LSI i) SLSI c) ii) IC iv) LSI iii) VLSI i) SLSI d) iii) VLSI iv) LSI i) SLSI ii) IC
Ans	c) ii) IC iv) LSI iii) VLSI i) SLSI
Q10.	Which of the following is the fastest memory? a) RAM b) Cache c) ROM d) Hard Disk
Ans	b) Cache
Q11	Binary number system comprises of the digits: a) 1, 2 b) 0, 1 c) a, b d) i, ii
Ans	b) 0, 1

Q12	_____ is volatile i.e. as long as the power is supplied to the computer, it retains the data in it a) RAM b) CD c) ROM d) Hard Disk
Ans	a) RAM
Q13	Arrange the following units of memory in decreasing order of storage i) KB (Kilobyte) ii) GB (Gigabyte) iii) MB (Megabyte) iv) TB (Terabyte) a) iv) TB ii) GB i) KB iii) MB b) ii) GB iv) TB i) KB iii) MB c) iv) TB iii) MB i) KB ii) GB d) iv) TB ii) GB iii) MB i) KB
Ans	d) iv) TB ii) GB iii) MB i) KB
Q14	Which of the following is not an input device? a) Scanner b) Speakers c) Webcam d) Joystick
Ans	c) Speakers
Q15	_____ is an electronic pathway composed of cables which connects the major parts of a computer system a) Motherboard b) Processor c) Bus d) Cache
Ans	c) Bus
Q16.	Which of the following cannot be the reason for data deletion from HDD? a) Data lost due to shutting down the PC b) Hacker attacking the system. c) Bad sector in Hard Disk d) Accidentally deleting a file.
Ans	a) Data lost due to shutting down the PC
Q17.	Which of the following is not a data recovery software? a) Recuva b) EaseUS c) Disk Drill d) Matlab
Ans	d. Matlab

Q18.	In which of the scenario do we need to recover data? a) When disk is full. b) When system performance has become slow. c) When a photo or video has been accidentally deleted. d) All of the above
Ans	b) When a photo or video has been accidentally deleted.
Q19.	Which of the following is an example of Proprietary software? a) Linux b) Windows c) Mozilla Firefox d) None of the above
Ans	c) Windows
Q20.	Cryptographic utilities are used to _____ files to prevent unauthorized users. a) Encrypt b) Decrypt c) Both of these d) None of thse
Ans	d) Both of these
Q21.	Operating System is an example of a) System software b) Utility program c) Application software d) None of the above
Ans	a) System software
Q22.	_____ is a software that can be freely downloaded and even distributed to others. a) Open source software b) Liteware c) Shareware d) Freeware
Ans	e) Shareware
Q23.	Word processing and desktop publishing are the examples of a) Hardware b) Software c) CPU d) None of these
Ans	Software
Q24.	The full form of OSS is _____ a) Operating system software b) Operating source software c) Open system software d) Open source software
Ans	d) Open source software
Q25.	An antivirus software is an example of _____ a) System software b) Pirated software c) Freeware d) Utility software
Ans	d)Utility software

Q26	_____ is designed to solve a specific problem or to do a specific task. a) System software b) Utility software c) User d) Application software
Ans	d) Application software
Q27	Which of the following is not a feature of a compiler? a) Execution time is more b) When all the syntax errors are removed execution takes place c) Scans the entire program first and then translate it into machine code d) Slow for debugging
Ans	a) Execution time is more
Q28	Which of the following is not an example of system software? a) Language Translator b) Utility Software c) Communication Software d) Word Processors
Ans	e) Word Processors
Q29	What is the process of deleting all the data on the hard drive? a) Delete b) Erase c) Formatting d) Uninstall
Ans	c) Formatting
Q30	A general purpose software is a type of _____ a) System software b) Database software c) Package software d) Application software
Ans	e) Application software
10 Assertion and reason Based question (1 Mark)	
Q1.	**Assertion (A):** Computers use binary code (0s and 1s) to represent and process data. **Reason (R):** Binary code is the fundamental language of computers, where 0 represents OFF and 1 represents ON in the context of electronic switches.
Ans	Both A and R are true and R is the correct explanation for A.
Q2.	**Assertion (A)**: Main/Primary memory is volatile. **Reason (R)**: ROM which is a part of main memory is non-volatile.
Ans	A is False but R is True.
Q3.	**Assertion (A)**: The CPU (Central Processing Unit) is often referred to as the "heart" of the computer. **Reason (R)**: The CPU is responsible for executing instructions and performing calculations, similar to the human heart's processing capabilities.
Ans	A is False but R is True.

<table>
<tr><td>Q4.</td><td>Assertion (A): RAM (Random Access Memory) is volatile memory.
Reason (R): RAM retains its data even when the computer is powered off.</td></tr>
<tr><td>Ans</td><td>A is True but R is False.</td></tr>
<tr><td>Q5.</td><td>Assertion (A): A scanner is an output device that produces hard copies of digital documents.
Reason (R): Scanners use sensors to capture images or text from paper documents, making them available for digital processing and storage.</td></tr>
<tr><td>Ans</td><td>A is False but R is True.</td></tr>
<tr><td>Q6.</td><td>Assertion : It is always good to keep the passwords encrypted while storing.
Reason : Encrypted data cannot be easily stolen by hackers.</td></tr>
<tr><td>Ans</td><td>Both A and R are true and R is the correct explanation for A</td></tr>
<tr><td>Q7.</td><td>Assertion : Windows 10 is a system software.
Reason : The software that protects a computer system from computer virus is system software</td></tr>
<tr><td>Ans</td><td>A is True but R is False.</td></tr>
<tr><td>Q8.</td><td>Assertion : Not all types of software are system software.
Reason : Application software are designed to carry out operations for a specific application.</td></tr>
<tr><td>Ans</td><td>Both A and R are true and R is the correct explanation for A</td></tr>
<tr><td>Q9.</td><td>Assertion : A software designed for a bank will work only for the account holders of that bank.
Reason: Customized software are tailor made software according to user requirements.</td></tr>
<tr><td>Ans</td><td>Both A and R are true and R is the correct explanation for A</td></tr>
<tr><td>Q10.</td><td>Assertion : A system software is also called as a manager.
Reason: Utility software assists the computer in maintaining it’s performance.</td></tr>
<tr><td>Ans</td><td>Both A and R are true but R is not the correct explanation for A</td></tr>
<tr><td colspan="2">10 Short Knowledge/Understanding/Application Based Questions (2 Marks)</td></tr>
<tr><td>Q1.</td><td>Differentiate between RAM and ROM.</td></tr>
<tr><td>Ans</td><td>.
<table><tr><td></td><td>RAM</td><td>ROM</td></tr><tr><td>i)</td><td>Full form is Random Access Memory</td><td>Full form is Read Only Memory</td></tr><tr><td>ii)</td><td>RAM is volatile memory that temporarily stores the files you are working on.</td><td>ROM is non-volatile memory that permanently stores instructions for your computer.</td></tr></table>.</td></tr>
<tr><td>Q2.</td><td>Where is cache memory located and what is its use?</td></tr>
</table>

Ans	Cache memory is located on the CPU itself or very close to it, typically on the same chip as the CPU. The primary purpose of cache memory is to store frequently accessed data and instructions, providing the CPU with faster access to this information than fetching it from the main memory (RAM).
Q3.	List out two arithmetic and two logical operators
Ans	Arithmetic operators: + – * / Logical operators: > ,< , >= , <=, = , !=
Q4.	Where registers are located and what are their uses?
Ans	Registers are located inside the central processing unit (CPU), and they are the smallest, fastest, and most accessible form of memory within a computer. CPU uses registers to either hold processing information or to store some part of data or some memory address or some instructions.
Q5.	What is the function of Control Unit in a CPU?
Ans	The functions of control unit are: i) It controls instruction execution. ii) It guides the interpretation, flow and manipulation of data.
Q6.	Deleting digitally stored data means changing the details of data at bit level, which can bevery time consuming. Therefore, when any data is simply deleted, its address entry ismarked as free, and that much space is shown as empty to the user, without actuallydeleting the data. In case data gets deleted accidentally or corrupted, there arises a need to recover thedata. Recovery of the data is possible only if the contents/memory space marked asdeleted have not been overwritten by some other data. i) Can you recover the data once deleted? Justify ii) Give any one security threat involved when we throw away electronic gadgets that are non-functional.
Ans	i) Yes, by Data Recovery. Data recovery is a process of retrieving deleted, corrupted and lost data from secondary storage devices. ii) ii) If these storage devices fall into the hands of mischief-mongers, they can easily 1 recover data from such devices; this poses a threat to data confidentiality.
Q7.	What are the two main categories of system software?
Ans	The two main categories of system software are: a) Operating system- It is a program which acts as an interface between the user and the hardware. b) Language processor- It is responsible for converting a High level code to machine language.
Q8.	What is data deletion? How does it work?
Ans	Data deletion is the process where the data is deleted from the system either accidentally or intentionally. Deleting stored data means changing the details of data at bit level, which can be very time consuming. Therefore when any data is simply deleted it's address entry is marked as free, and that much space is shown empty to the user.

Q9. What is the difference between system software and application software.

Ans

System Software	Application software
System software is mainly designed for managing system resources.	Application softwareis mainly designed to accomplish tasks for specific purposes.
Programming of system software is complex.	Programming of application software is comparatively easy.
A computer cannot run without system software.	A computer can easily run without an application software.
System software do not depend on application software.	Application software do depend on system software.

Q10. What is the difference between customized software and generic software.

Ans

Customized software	Generic software
Designed for a specific user's or organization's needs.	Designed for a broad range of users with general needs.
Specific maintenance and support required.	Standard maintenance and support required.
Longer development time required to meet all the needs.	Shorter development time required.

10 Short Knowledge/Understanding/Application Based Questions (3 Marks)

Q1. What is the IPO cycle in a computer?

Ans

The IPO cycle, which stands for Input-Processing-Output cycle, is a fundamental concept in computer science and information processing. It describes the sequence of operations that a computer follows to process data and produce results.

Here's an overview of each phase in the IPO cycle:

- Input: In this phase, data or information is collected from external sources or input devices, such as keyboards, mice, sensors, or storage devices like hard drives and network connections. Input can be in the form of text, numbers, images, sound, or any other data type.
- Processing: In the processing phase, the computer performs various operations on the input data. This can include calculations, transformations, comparisons, sorting, filtering, and executing instructions specified by software programs.
- Output: After processing, the computer generates results or output data. Output can take various forms, such as displaying information on a screen, printing a document, saving data to storage, sending data over a network, or producing sound through speakers.

Q2. List out at least three differences difference between cache memory and registers in a computer?

Ans

	Cache Memory	Registers
i)	Cache memory offers fast access times but is slower than registers	Registers are the fastest form of memory in a computer, with almost instant access times.
ii)	Cache memory is located between the CPU and the main memory. It can be on the CPU chip itself.	Registers are part of the CPU's architecture and are located directly on the CPU chip.
iii)	Cache memory is used to store frequently accessed data and instructions from the main memory, optimizing overall system performance by reducing memory latency.	Registers are used for temporary storage of data and instructions that are actively being processed by the CPU. They are crucial for executing instructions and performing calculations.

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Q3. Write the full forms of the following:

SMPS USB CRT UPS BIOS PROM

Ans

SMPS → Switched-Mode Power Supply

USB → Universal Serial Bus

CRT → Cathode Ray Tube

UPS → Uninterruptible Power Supply

BIOS → Basic Input Output System

PROM → Programmable Read-Only Memory

Q4. Mr Rakesh has eleven CDs each of capacity 700 MB containing MP3 songs of legendary singers of Bollywood. After few years he discovers that the CDs are becoming corrupt. So he wants to transfer the songs to a pen drive for keeping them. How much minimumcapacity pen drive should he purchaseif pen drives are available in 2 GB, 4 GB, 8 GB and 16 GB sizes?

Ans

Capacity of 1 CD=700 MB

Capacity of 11 CDs=700*11=7700 MB

1024 MB = 1 GB

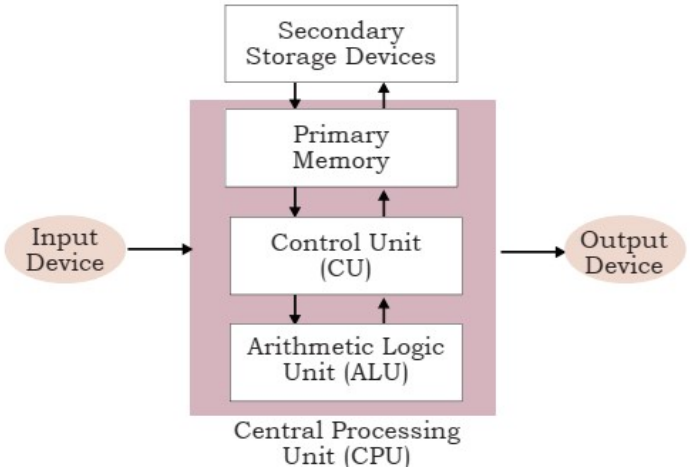
So no of GB in 7700 MB=7700/1024=7.5 GB

Hence Mr.Rakesh should purchase a 8 GB pendrive to transfer the songs in the 11

	CDs.
Q5.	Write at least three differences between keyboard and mouse.
Ans	

	Keyboard	Mouse
i)	A keyboard is primarily used for entering text, numbers, and various commands. It is the primary input device for typing and text-based input.	A mouse is primarily used for pointing, selecting, and interacting with graphical elements on the computer screen. It provides precise cursor control.
ii)	Users interact with a keyboard by pressing physical keys, each of which corresponds to a specific character or function.	Users move a physical mouse on a flat surface, and the movement is translated into corresponding on-screen cursor movements. Mice have buttons for clicking and scrolling wheels for navigating content.
iii)	Keyboards are commonly used for word processing, data entry, programming, web browsing, and executing keyboard shortcuts.	Mice are commonly used for navigating graphical user interfaces, selecting files and icons, gaming, graphic design, and web browsing.
iv)	Keyboards offer a range of keyboard shortcuts for various functions, making them efficient for tasks like copying, pasting, saving, and undoing actions.	Right-clicking with a mouse opens context menus, providing quick access to various options and actions related to the selected item.

Q6.	Suman has discarded old, broken and malfunctioning Hard Disk without taking care to delete data. Is it harmful in respect of security concern? Justify your answer.
Ans	Yes, as it invites hackers/malware to see through your data. (Knowledge) (1 mark to be awarded for yes/no and 2 mark for the correct justifications).
Q7.	What is a data backup software? How can it help in data recovery?
Ans	Data backup software is a software whose primary function is to copy and save the data to an external source. This could be either a drive, server, data centre, or the cloud. The main role of backup and recovery is to preserve critical data in case of loss or damage. In case of a disaster — natural or manmade including a ransomware attack the backed up data can be retrieved and restored.
Q8.	Give three techniques to prevent accidental file deletion.
Ans	Three popular techniques to prevent accidental file deletion are as follows: a) We can configure the Permissions Settings to allow us to grant or deny file access to other users.

	b) we can simply hide the files from the file properties option. c) We can password protect the file using third party software.
Q9.	Why is operating system also called a resource manager?
Ans	a) The OS manages these resources and allocates them to particular programs. b) The CPU is one kind of resource and the OS decides how much processor time should be given for the execution of a particular program. c) OS also manages memory and I/O devices when multiple users are working simultaneously.
Q10.	What is an OSS? How is OSS different from FOSS.
Ans	Open source software is software developed and maintained by open collaboration, and made available, typically at no cost, for anyone to use, examine, alter and redistribute however they like. Open Source Software refers to software whose source code is available to customers while FOSS is a software that is both free software as well as open-source software. (2 marks for correct definition and 1 mark for difference)
10 Short Knowledge/Understanding/Application Based Questions (4 Marks)	
Q1.	Modern computers are based on Von Neumann Architecture. What does Von Neumann Architecture comprise of?
Ans	Von Neumann architecture comprises of: i) Central Processing Unit ii) Memory to store data and programs iii) Input and output devices iv) Communication channels to send/receive the output data
Q2.	Draw the block diagram of a computer system. Briefly write about the functionality of each component.
Ans	 Block diagram of a computer system. Three components of computer are: • Central Processing Unit (CPU), • Input Devices, • Output Devices

Central Processing Unit: It is the brain of the computer system. It broadly comprises of Arithmetic Logic Unit(ALU) and Control Unit(CU). ALU is responsible for performing the various Arithmetic operations and Logical operations on integers. CU is responsible for controlling all the activities which are performed inside the computer system.

Input Devices: They accept data from the user or outside the environment. It sends data & instructions in binary form to the computer for further processing. Example: keyboards, mouse, scanners etc.

Output Devices: They receive data or information from memory. This data is converted into human readable format and shown to the user.Example: Monitor, Printer etc.

Q3. List out four differences between RAM and Hard Disk.

Ans .

	RAM	Hard Disk
i)	It is a type of Primary Memory	It is a type of Secondary Memory
ii)	RAM is volatile memory that temporarily stores the files you are working on.	Hard Disk is non-volatile memory that permanently stores data or instructions for your computer.
iii)	RAM has higher speed than Hard Disk	Hard Disk has lower speed than RAM
iv)	Cost of per unit memory is more in RAM	Cost of per unit memory is less in Hard Disk

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Q4. What was the basic electronic component of:

1st Generation of Computers

2nd Generation of Computers

3rd Generation of Computers

4th Generation of Computers

Ans 1st Generation of Computers mostly comprised of vacuum tubes

2nd Generation of Computers mostly comprised of transistors

3rd Generation of Computers mostly comprised of integrated circuits

4th Generation of Computers mostly comprised of VLSI circuits

Q5. Define the following terms in relation to computers:

a) Booting b) BIOS c)POST d) CMOS

Ans	a) Booting The booting process in a PC (Personal Computer) is the sequence of events that occurs when you turn on the computer to start the operating system (OS). It involves the computer's hardware and firmware working together to load the OS into memory, allowing the computer to become functional. b) BIOS BIOS (Basic Input/Output System) is firmware that serves as the computer's system software. Its primary role is to initialize the hardware and provide the initial software environment for the boot process. BIOS configures critical hardware settings, such as the system clock, CPU parameters, and boot device order. It locates the bootable device (e.g., a hard drive or SSD) based on the boot order specified in BIOS settings. c)POST The BIOS built into the motherboard's ROM (Read-Only Memory) chip initiates a Power-On Self-Test (POST). During POST, the BIOS checks the hardware components (CPU, RAM, storage devices, graphics card, etc.) to ensure they are functioning correctly. Any detected issues are reported via beep codes or error messages. d) CMOS CMOS stands for Complementary Metal-Oxide-Semiconductor. CMOS technology is a semiconductor technology used to manufacture integrated circuits, and it is particularly known for its low power consumption. In the context of personal computers, the term "CMOS" is commonly associated with the CMOS battery, which powers the CMOS chip on the motherboard and maintains vital system settings and the system's real-time clock when the computer is turned off.
Q6.	Give two reasons for data deletion. How can data deletion from unauthorized persons be prevented?
Ans	The reasons for data deletion are as follows: a) The storage device can malfunction or crash down leading to data loss. b) Users can accidentally erase data from storage devices. (1 mark each for any other reason of deletion) Data deletion from unauthorized persons can be prevented by: a) Limiting access to the computer system by using passwords. b) Keep files encrypted to prevent it from unwanted modification. (1 mark each for any other correct answer)
Q7.	Give two similarities and two differences between a compiler and interpreter.
Ans	Two similarities between compiler and interpreter are: a) Both compiler and Interpreter are language translators. b) Both compiler and interpreter are used to find errors in the source code and debug them.

Differences are as follows:

Compiler	Interpreter
It takes the entire program in one go.	An interpreter takes a single line of code at a time.
The compiler generates an intermediate machine code.	The interpreter does not produce an intermediate machine code.
The compiler is used by programming languages such as C,C++,Java etc.	The interpreter is used by programming languages such as Python, Ruby etc.

Q8. Give four major functions of an operating system.

Ans
a) Allocates and deallocates the memory and it keeps a record of which part of primary memory is being used by which process.
b) When more than one process runs on the system the OS decides how and when a process will use the CPU.
c) It keeps records of the status and locations of files and allocates and deallocates resources.
d) An operating system regulates device connection using drivers. The processes may require devices for their use.

Q9. Give four techniques to prevent loss of data due to security reasons.

Ans
a) Backing up the Data-It is always good to have a backup strategy or several backups of the company's data.
b) Encrypt Sensitive Data-Encryption makes it exceedingly difficult for an unauthorized individual to comprehend or use stolen data.
c) Use SoftwareAnti-virus and anti-malware software protects our system from programs that can wipe out data or from threats that can block access to our critical files.
d) Having a Password Policy: Creating and enforcing a password policy makes it more challenging for a bad actor to crack employees' passwords and get into your system.

Q10. What is language translator? Mention the three main types of language translators.

Ans
A language translator is a program that converts source code into object code.
Generally, there are three types of translator:
Compiler: A compiler takes the source code as a whole and translates it into object code all in one go.
Interpretor: An interpreter translates source code into object code one instruction at a time.
Assembler: an assembler converts assembly level language code into machine language code.

07 Case Based Questions (5 Marks)

Q1. Ramesh wants to purchase a new PC. He is trying to choose a PC within his budget which will work fast. Which of the following components are compulsory and which are optional and explain why?

a) Scanner

b) Keyboard

c) Printer

d) Monitor

e) Mouse

Ans
a) A scanner is **not essential** for the working of a PC. In future if Ramesh has to scan documents or pictures regularly, he may buy it.

	b) A computer keyboard is an **essential** input device used to enter characters and functions into the computer system by pressing buttons, or keys. It is the primary device used to enter text. A keyboard typically contains keys for individual letters, numbers and special characters, as well as keys for specific functions. c) A printer is **not essential** for the working of a PC. However if Ramesh frequently needs hard copies of various documents from PC, he may buy it in future. d) A computer monitor is an **essential** and mainoutput device for a PC. The primary use of a monitor is to display images, text, video, and graphics information generated by the computer via a computer's video card. e) A mouse is an **essential** input device used to point at objects you see on the screen. By pointing at an object, you tell the computer that you want to do something with that object. For example, say you wanted to start a program. There's a small picture, called an icon, on the computer screen that represents that program.
Q2.	Sweta has recently installed new software on her 1 year old laptop after which the speed of the laptop has become quite slow. She is confused regarding which of the following must be upgraded for better speed. Help her to understand the role of each of the following components and which of them will ultimately improve the speed of the laptop. a) Hard Disk b) ROM c) RAM d) Processor e) Network
Ans	a) Since laptop was working properly and the hard disk is relatively new, there is no need to upgrade the hard disk. b) ROM contains the programming that allows a computer to start up or regenerate each time it is turned on. So the ROM is also not the cause of the problem. c) Generally, the faster the RAM, the faster the processing speed. Since the laptop has become slow after installation of a new software, there is a possibility that the new software needs more RAM for smooth working of the laptop. Hece RAM must be upgraded. d) A processor also affects the speed of a laptop. But since the laptop was functioning properly till recently and the laptop and itsprocessor being new, there is no need to upgrade the processor. e) A network has nothing to do with the speed of the laptop. Its role is only to transfer files from one laptop to other.

Q3.	Classify on which the following areas computers have a positive or negative impact. Justify your answer with suitable reason. a) Accuracy b) Speed c) Health d) Employment e) Social Relations
Ans	a) Accuracy of calculations have been greatly enhanced by computers. Computers are machines which can repeatedly do calculations with consistent accuracy. b) Speed of doing various tasks have improved due to high processor speeds of a computer. c) Health of human beings often adversely affected due to working for long hours on a computer. Improper postures can cause back, neck and shoulder pains, headache, eye strain and overuse injuries of the arms and hands.You can help avoid computer-related injuries with proper furniture, better posture and good working habits. d) Computer has led to reduction of employment opportunities for unskilled workers whereas it had given rise to ample opportunities for skilled manpower. e) On one hand people are becoming lonelier due to less time for interpersonal relationships. On the other hand people areSocializing more using social platforms. Hence to an extent computers are helping people to socialize more.
Q4.	Anisha was in the middle of a typing a letter in Microsoft Word when suddenly power went off. a) Do you think she will get back the entire text she had typed in the letter. b) If not what is the reason? c) What would you suggest her to not face the problem again? d) Can you suggest any device to prevent the above problem? e) Which is better a writeable DVD or an external hard disk for long term storage?
Ans	a) I don't think she will be able get back the entire letter. b) Because the latest portions of the letter which was being typed was on the RAM which being volatile loses its data as soon as power is switched off. c) She should continuously save the work after every few moments. d) She must use a UPS to avoid this type of data loss. e) An external HDD will last longer than a writable DVD.
Q5.	Sunil is a student of fine arts and wants to draw a potrait which he has to send someone by email. a) Do you think he should draw it on canvas and scan the image or can he draw it on

	a PC? Which one is better if he knows how to draw on a PC? b) Can a touchscreen make his work easier? c) If he cannot afford a touchscreen, suggest him a suitable input device for drawing theportrait. d) He manages to draw a portrait but is unable to determine what type of printer should be used. Suggest him a suitable printer along with the reason. e) Do you think a separate graphics card is essential for drawing in a PC.
Ans	a) Considering above scenario it will be better to draw on a PC because we can repeatedly modify the portrait in the PC until he is satisfied. On the other hand the same will not be possible on the canvas. b) Yes a touchscreen can serve as a digital tablet and make work easier for an artist. c) He will need compatible a digital pen and stylus if he doesn't have a touchscreen. d) He should use a plotter as it gives him the flexibility to print in various sizes on various media. e) No graphics card is not essential for drawing. However a graphics card can offload work and reduce memory-bus-contention from the CPU and system RAM, therefore the overall performance for a computer could improve in addition to increased performance in graphics processing.
Q6.	Mr Samrat is a data recovery expert at ABC Computer Pvt limited company. He has been assigned the task to keep the data in every system safe and protected from unauthorized personnel. i) Which among the following methods should he use to keep the company's data safe from outsiders a) Install a disk backup software b) Set password to authenticate users at the time of login c) Perform boot time scan of the system d) All the above. ii) Which of the following is a sign that the data in removable disk is corrupted? a) Files in removable disk are opening slowly. b) System is taking more time to open. c) Files in removable disk could not be read. d) None of the above iii) A user in his company has mistakenly deleted a file. How can he get back the file? a) By creating the file once again. b) By restoring it from the recycle bin. c) By searching for the file in drives of the system d) None of the above. iv) Mr Samrat notices that whenever a pen drive is connected in his system all files and folders in it become hidden. What could be the possible reason for it?

	a) Operating system has become corrupted. b) File explorer is not working properly. c) Pen drive has become faulty. d) There may be a malware in the pen drive or system. v) Which software would you suggest to increase the performance of the hard disk. a) Disk Cleaner b) Anti Virus c) Disk Boost d) Disk Defragmenter
Ans	i) b) Set password to authenticate users at the time of login ii) c) Files in removable disk could not be read. iii) b) By restoring it from the recycle bin. iv) d) There may be a malware in the pen drive or system. v) d) Disk Defragmenter
Q7.	Mrs Sunita wants to buy a laptop for her personal work. She is a teacher in Indira Public School. She has searched in the internet and she found two laptops with the same configuration. One with DOS version and another with pre loaded Windows. 1.Why is the price of the pre loaded Windows system more than the DOS version? a) DOS version is not user friendly. b) DOS version does not support installing other software. c) In pre-loaded Windows system an OS is already installed and it's cost is included. d) None of the above. 2. Which software she needs to install in the DOS version? a) Utility software b) Application software c) Operating system d) None of the above. 3. She wants to install software for spread sheet work. Suggest a suitable software for her. a) MS Excel b) MS Word c) MS Power Point d) All the above 4. Which software among the following should she update to protect her system from virus? a) Windows Media Player b) Windows Defender c) MS Office d) None of the above 5. She wants to use the internet for surfing content. Which among the following would be the most suitable software for it. a) Internet Explorer b) Mozilla Firefox c) Google Chrome d) All the above
Ans	1. c) In pre-loaded Windows system an OS is already installed and it's cost is included. 2. c) Operating system 3. a) MS Excel 4. b) Windows Defender 5. d) All the above

Name of the chapter : **Introduction to Python**

Topic Covered

- Basics of Python programming,Python interpreter-interactive and script mode, the structure of a program,
- Indentation,identifiers,keywords,constants,variables,types of operators,precedence of operators,data
- Types,mutable and immutable data types,statements,expressions,evaluation and comments, input and output statements
- Data type conversion,debugging.
- Control Statements:if-else,**if-elif-else, while loop,**forloop
- Lists: list operations-creating,initializing,traversing and manipulating lists,list methods and built-infunctions.– len(),list(),append(),insert(), count(),index(),remove(), pop(), reverse(), sort(), min(),max(),sum()
- Dictionary: concept to fkey-value pair, creating,initializing,traversing, updating and deleting elements,dictionary methods and built-infunctions.– dict(), len(), keys(), values(), items(), update(), del(), clear()

Key Points

Python interpreter To execute a program in a high-level language by translating it one line ata time interactive mode, A way of using the Python interpreter by typing commands and expressions at the prompt.
script mode, A way of using the Python interpreter to read and execute statements in a script.
In Python, everything is an object. For example, numbers, strings, functions, classes, and modules are all objects. Every Python object has three core characteristics that define it at a foundational level. These characteristics are: Value ,identity

In Python, variables don't have an associated type or size, as they're labels attached to objects in memory

Python **objects** are concrete pieces of information that live in specific memory positions on your computer.

An object's value is probably the only characteristic that you'd want to change in your code. An object that allows you to change its values without changing its identity is a **mutable**

In contrast, an object that doesn't allow changes in its value is an **immutable** object.

Control Statements- It allows programmers to control the execution flow of a program or one of its sections.
if statement- if statement consists of a Boolean expression followed by one or more statements. If the condition is True, the statements under if statements are executed.
if else-An if else statement consists of a Boolean expression followed by one or more statements. If the condition is True, the statements under if statements are executed. If the condition is false, statements under else part is executed
if elif- An if statement followed by one or more elif Statements, that consists of Boolean expressions and then followed by an optional else statement, which executes when all the condition becomes false.
Nested if - An if statement inside another if or elif statement(s).
Loop- executes a statement or group of statements multiple times

while loop- It consists of a Boolean expression written along with while keyword followed by one or more statements which will be executed as long as condition is True
for loop- Executes a sequence of statements multiple times and abbreviates the code that manages the loop variable
break - It is used to terminate the loop.
continue -It is used to skip all the remaining statements in the loop and move controls back to the top of the loop.
pass-This statement does nothing. It can be used when a statement is required syntactically but the program requires no action.

Definition :

A list is a data structure in Python that is a mutable, or changeable, ordered sequence of elements.
Example:- L1=[10,25,100,500], L2=[1, 2, 2.5, 10.0, 'a', 'b'], L3=[1,[2,3],4]

List Creation:

```
L1=[] or L2=list( )      # To create empty list
L3=[10,25,100,500]  # To create and initialize list
L4=eval(input("Enter elements of the list")) #to create and initialize by user input
```

List Traversing and Manipulation:

Every element of the list has an unique sequential index(position) starting from 0
List elements can be accessed and manipulated by index.
if LST=[3,6,9,12,15] then
LST[1] ---->refers second element, i.e 6
LST[3]=20 ----> modifies the 4th element as 20.

To traverse and display all elements of the list:-

```
for item in LST:
    print (item)
```

List Operators:

Concatenation (+)

Joins two lists. For example if L1=[1,2,3], L2=[4,5] then L1+L2 ---> [1,2,3,4,5]

Replication (*)

Replicates the list given number of time.
For example , L1*3 ----->[1,2,3,1,2,3,1,2,3]

Membership (IN / NOT IN)

Checks if an element is present or not.
For example : 2 in L1---> True 2 in L2--->False

Comparison (==, !=, >, <, >=, <=)

Compares two lists element by element
For example:
L1==L2---->False L1!=L2= True L1>L2-----> False

Slice (:)

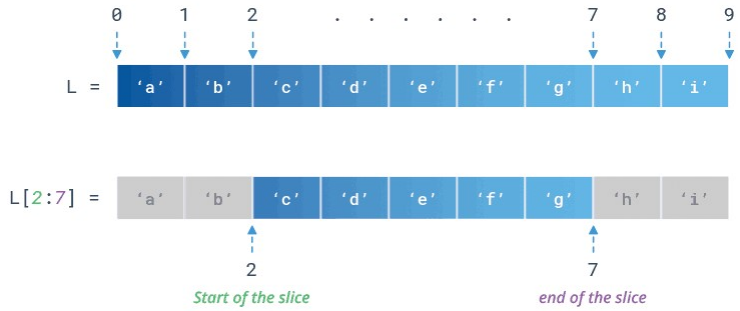
To access a range of items in a list, you need to slice a list. One way to do this is to use the simple slicing operator ":".
Syntax:

```
L[start:stop:step]
```

Start position End position The increment

Note: If step is omitted, default step in 1.
Example:

```
L = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i']
print(L[2:7])
# Prints ['c', 'd', 'e', 'f', 'g']
```



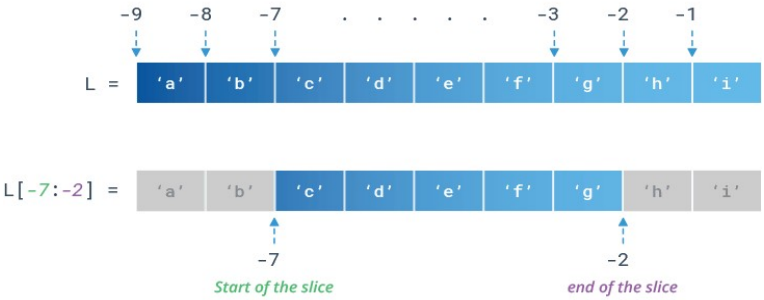
Note: Last index is always excluded.

Negative Index:

L = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i']

print(L[-7:-2])

Prints ['c', 'd', 'e', 'f', 'g']



Built in Functions

len()

returns the no of size/no of elements. len(L1)---->3 , len(L2)----->2

min()

returns minimum element min(L1) ----->1

max()

returns maximum element max(L2) ----->5

sum()

returns sum of elements sum(L2) ----->9 sum(L1)----->6

List Functions

append()

adds an element at the end of the list

L1.append(10) ------> [1,2,3,10]

insert()

insert an element at a given index

L2.insert(1,2.5) ------->[4,2.5,5]

count()

returns the frequency of an element

Val=[2,4,6,4,7,3,4]

Val.count(4)------>3

index()

returns the index of an element

Val.index(6)------>2

remove()
delete the element with a given value
Val.remove(7) -----> [2,4,6,4,3,4]

pop()
delete the element with a given index . If no index is given, last element is deleted
Val.pop(2) -----> Val=[2,4,4,7,3,4]
reverse()
Val.reverse( )----->[4,3,7,4,4,2]
arranges the elements of the list in a reverse order
sort()
arranges the elements of a list in ascending order.
cars = ['Ford', 'BMW', 'Volvo']
cars.sort() ----> ['BMW', 'Ford', 'Volvo']
clear( )
deletes all elements of the list
Num=[1,4,7,9]
Num.clear() -----> Will give empty list
extend()
Merge the elements of a list in the current list
L1.extend(L2) ----->[1,2,3,4,5]
L2.extend(L1) ------>[4,5,1,2,3]
Dictionary

- Dictionary has some similarities with string, list and tuple but it is different in terms of storing and accessing an element. String, list and tuple are sequences whereas a dictionary is a mapping. Rather than having an index associated with each element, Dictionaries in Python have a **key** associated with each element. Python Dictionaries are a collection of **key value pairs**.
- In other ways, you can think keys as user defined indices.
- In English Dictionary, we search any word for meaning associated with the word. Here Word is the **Key** and meaning is the **value**.

Dictionary Creation:

- Syntax:
  <dictionay_name>={<key1>:<value1>, <key2>:<value2>, ……..
  <keyn>:<value n>}
- Example:
  Price={ 'Redmi Note8': 10500, 'Galaxy A70s': 25900,
  'OppoA31':12490}
  Here 'Redmi Note8', 'Galaxy A70s' and 'Oppo A31' are Keys and 10500, 25900, 12490 are values.

- Dict1={} #Empty Dictionary
- TeacherCount={'PGT':10, 'TGT':7, 'PRT':5}
- Note: Keys of a Dictionary must be of immutable types, such as:
  * A Python string
  * A number.
  * A tuple (containing only immutable types)
  If we try to give a mutable type as key, Python will give an error.

Accessing elements of a Dictionary:

- We need a key to access any element of a Dictionary likewise in lists, strings and tuples we used index to access any element.

- Example:
  ```
  >>> TeacherCount={'PGT':10, 'TGT':7, 'PRT':5}
  >>> TeacherCount{'PGT': 10, 'TGT': 7, 'PRT': 5}
  >>> TeacherCount['PGT']
  10
  ```
- Note: Attempting to access a key that doesn't exist causes an error

Traversing a Dictionary:

- Traversal of a collection means accessing and processing each element of it.
- for loop is efficient to traverse any collection and sequence. for loop will get every key of Dictionary and we can access every element of the Dictionary based on the keys.
- **Example:**
  ```
  >>> TeacherCount={'PGT':10, 'TGT':7, 'PRT':5}
  >>> TeacherCount
  {'PGT': 10, 'TGT': 7, 'PRT': 5}
  >>> for i in TeacherCount:
                  print('Key is ',i, 'Value is ',TeacherCount[i])
  Key is  PGT Value is  10
  Key is  TGT Value is  7
  Key is  PRT Value is  5
  ```

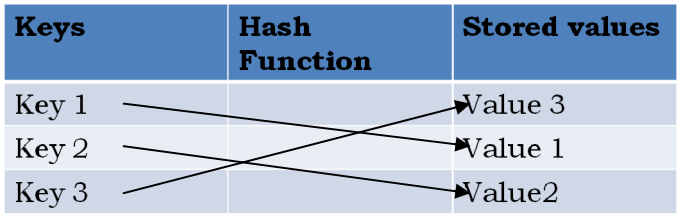
Accessing Key and Values Simultaneously:

- Accessing all keys in a Dictionary in one go:
  <dictionary>.keys()
  Example:
  ```
  >>> TeacherCount={'PGT':10, 'TGT':7, 'PRT':5}
  >>> TeacherCount
  {'PGT': 10, 'TGT': 7, 'PRT': 5}
  >>> TeacherCount.keys()
  dict_keys(['PGT', 'TGT', 'PRT'])
  ```
- Accessing all values in a Dictionary in one go:
  <dictionary>.values()
  Example:
  ```
  >>> TeacherCount.values()
  dict_values([10, 7, 5])
  ```

Characteristics of a Dictionary:

- **Unordered Set:**
  A dictionary is a unordered set of key:value pair.
- **Not a Sequence:**
  Unlike a string, list and tuple, a dictionary is not a sequence because it is unordered set of elements. The sequences are indexed by a range of ordinal numbers. Hence, they are ordered, but a dictionary is an unordered collection.
- **Indexed by keys, Not numbers:**
  Dictionaries are indexed by keys. Keys are immutable type. But the values of a dictionary can be of any type.
- **Keys must be unique:**
  Each keys of a Dictionary must be unique. However two unique keys can have same values.
- **Mutable:**
  Like lists, dictionaries are mutable. We can change the value of a key in **place**.

- **Internally stored as Mappings:**
  Internally, the key:value pairs of a dictionary are associated with one another with some internal function (called hash-function). This way of linking is called mapping.



Multiple ways of Creating Dictionaries:

1. Initializing a Dictionary:

In this method all the **key:value** pairs of a dictionary are written collectively, separated by commas and enclosed in curly braces.

Example:

```
T20Cricketer={'Name':'Virat', 'Runs':2794, 'Age':31}
```

2. Adding key:value pairs to an empty Dictionary:

In this method, first we need to create an empty dictionary and then keys and values are added to it one pair at a time.

Two ways of creating empty dictionary:

- T20Cricketer={}

and

- T20Cricketer=dict()

Next step is to add key:value pairs, one at a time as per syntax given below:

<dictionary>[<key>]=<value>

Example:

```
>>> T20Cricketer['Name']='Virat'
>>> T20Cricketer['Runs']=2794
>>> T20Cricketer['Age']=31
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

3. Creating a Dictionary using dict():

(i) Specify Key:Value pairs as keyword arguments to dict() function:

Example:

```
>>> T20Cricketer=dict(Name='Virat', Runs=2794, Age=31)
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

(ii) Specify comma-separated Key:Value pairs:

Example:

```
>>> T20Cricketer=dict({'Name':'Virat', 'Runs':2794, 'Age':31})
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

(iii) Specify Key:Value pairs separately in form of sequences:

In this method, one list or tuple of individual key value pair is passed as argument to dict().

Example1:

```
>>>T20Cricketer=dict([['Name','Virat'],['Runs',2794],
                                        ['Age',31]])
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

Example 2:

```
>>>T20Cricketer=dict((('Name','Virat'),('Runs',2794),
                            ('Age',31)))
```

```
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

Example3:

```
>>>T20Cricketer=dict((['Name','Virat'],['Runs',2794],
                    ['Age',31]))
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

Example 4:

```
>>>T20Cricketer=dict([('Name','Virat'),('Runs',2794),
                    ('Age',31)])
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
```

- **Adding Elements to Dictionary:**

<dictionary>[<key>]=<value>

Example:

```
>>> T20Cricketer={'Name':'Virat','Runs':2794,
                  'Age':31}
>>> T20Cricketer['Country']='India'
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31, 'Country':'India'}
```

N.B: Key to be added must not exist in dictionary and must be unique. If the Key already exists, then it will change the value of existing key and no new entry will be added to dictionary.

- **Updating Existing Elements in a Dictionary:**

<dictionary>[<key>]=<value>

Example:

```
>>> T20Cricketer={'Name':'Virat','Runs':2794,
                  'Age':31}
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
>>> T20Cricketer['Name']='Rohit'
>>> T20Cricketer
{'Name': 'Rohit', 'Runs': 2794, 'Age': 31}
```

N.B: Key must exist in the dictionary otherwise new entry will be added to dictionary.

- **Deleting Elements from a Dictionary using del:**

del <dictionary>[<key>]

Example:

```
>>> T20Cricketer={'Name':'Virat','Runs':2794,
                  'Age':31}
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
>>> del T20Cricketer['Age']
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794}
```

N.B: Key must exist in the dictionary otherwise Python gives KeyError.

- **Checking for Existence of a Key:**

Membership operators in and not in are used to check for the existence of Keys only.

<key> in <dictionary>

<key> not in <dictionary>

Example:

```
>>> T20Cricketer={'Name':'Virat','Runs':2794,
                                    'Age':31}
>>> 'Runs' in T20Cricketer
True
>>> 'Age' not in T20Cricketer
False
>>> 'Virat' in T20Cricketer
False
# Here 'Virat' is not a key
```

- **Checking for Existence of a Value:**

  <value> **in** <dictionary>.values()

  <value> **not in** <dictionary>.values()

  Example:

```
>>> T20Cricketer={'Name':'Virat','Runs':2794,
                    'Age':31}
 >>> 'Virat' in T20Cricketer.values()
True
```

- **Functions and Dictionary Methods:**

1. len(Dictionary):

Returns total number of elements present in the dictionary.

Example:

```
T20Cricketer={'Name':'Virat','Runs':2794,'Age':31}
>>> len(T20Cricketer)
3
```

2. Dictionary.keys():

Returns a list of keys of the dictionary.

Example:

```
>>> T20Cricketer.keys()
dict_keys(['Name', 'Runs', 'Age'])
```

3. Dictionary.values():

Returns a list of values of the dictionary.

Example:

```
>>> T20Cricketer.values()
dict_values(['Virat', 2794, 31])
```

4. Dictionary.items() :

Returns all of the items of the dictionary as a sequence of (key,value) tuples

Example:

```
>>> T20Cricketer.items()
dict_items([('Name', 'Virat'), ('Runs', 2794), ('Age', 31)])
```

5. Dictionary.update(other dictionary) :

Merges key:value pairs from the other dictionary to the original Dictionary. It updates the value of the keys if the keys exist in the original dictionary otherwise adds the key:value pair to the original Dictionary.

Example:

```
>>> T20Cricketer
{'Name': 'Virat', 'Runs': 2794, 'Age': 31}
>>> T20Cricketer2
{'Name': 'Rohit', 'Age': 33, 'Country': 'India'}
```

```
>>> T20Cricketer.update(T20Cricketer2)
>>> T20Cricketer
{'Name': 'Rohit', 'Runs': 2794, 'Age': 33, 'Country': 'India'}
>>> T20Cricketer2
{'Name': 'Rohit', 'Age': 33, 'Country': 'India'}
```

6. del <Dictionary>[<key>]

Deletes key:value pair or element of the Dictionary.

Example:

```
>>> T20Cricketer
{'Name': 'Rohit', 'Runs': 2794, 'Age': 33, 'Country': 'India'}
>>> del T20Cricketer['Country']
>>> T20Cricketer
{'Name': 'Rohit', 'Runs': 2794, 'Age': 33}
```

7. del Dictionary

Deletes entire Dictionary

Example:

```
>>> del T20Cricketer2
>>> T20Cricketer2
NameError: name 'T20Cricketer2' is not defined
```

8. Dictionary.clear()

Removes all items of the Dictionary leaving the Dictionary empty.

Example:

```
>>> T20Cricketer2
{'Name': 'Rohit', 'Runs': 2773, 'Age': 33}
>>> T20Cricketer2.clear()
>>> T20Cricketer2
{}
```

Nested Dictionary:

A Dictionary is called nested if there is at least one Dictionary as a value of key.

Example

```
>>> CSTeacher={'Name':{'Fname':'Rajat','Lname':'Bhatia'},'Desig':'PGT'}
>>> CSTeacher
{'Name': {'Fname': 'Rajat', 'Lname': 'Bhatia'}, 'Desig': 'PGT'}
>>> CSTeacher['Name']
{'Fname': 'Rajat', 'Lname': 'Bhatia'}
>>> CSTeacher['Name']['Fname']
'Rajat'
```

55 Objective Question (1 Mark)

Q1.	What are the two modes of Python interpreter?
Ans	Interactive mode and script mode
Q2.	Identify the invalid identifier: (a) sum1 (b) _sum (c) sum@ (d) SUM
Ans	(c)
Q3.	In _____ mode of Python, we can save the program.
Ans	Script
Q4.	Which is of the following is not a constant? (a) True (b) “Hello” (c) 3.14 (d) sum
Ans	(d)

Q5.	Identify the immutable data type: (a) dictionary (b) int (c) list (d) set
Ans	(b)
Q6.	Which one of the following is the correct extension of the Python file? a) .py b) .python c) .p d) None of these
Ans	(a)
Q7.	Which is the correct operator for power(xy)? a) X^y b) X**y c) X^^y d) None of the mentioned
Ans	(b)
Q8.	Python supports dynamic typing. – True / False
Ans	True
Q9.	a = 5 > 2 What will be the data type of the variable a? (a) True (b) int (c) bool (d) None of these
Ans	(c) bool
Q10.	Which of the following is not a token : (a) // (b) "a" (c) 3.14 (d) ##
Ans	(d)
Q11	What will be the output of the following code snippet: n=3 n=4 n=n+n print(n) (a) 7 (b) 6 (c) 1 (d) 8
Ans	(d)
Q12	What will be the value of the following Python expression : 4 + 3 % 5 (a) 2 (b) 4 (c) 7 (d) Error
Ans	(c)
Q13	Which function displays the memory location of an object/variable ?
Ans	id( )
Q14	_____ spaces should be left for indentation. (a) 2 (b) 3 (c) 4 (d) 1
Ans	(c) 4
Q15	Python is case-sensitive – True / False.
Ans	True

Q16.	What keyword would you use to add an alternative condition to an if statement? a) else if b) elseif c) elif d) None of the above
Ans	c) elif
Q17.	How is a code block indicated in Python? a) Brackets b) Indentation c) Key d) None of the above
Ans	b) Indentation
Q18.	The order of execution of the statements in a program is known as: a) flow of control b) central flow c)selection d) iteration
Ans	a) flow of control
Q19.	Number of elif in a program is dependent on the _____ a) number of conditions to be checked b) number of variables in a program c) number of loops in a program d) None of the above
Ans	a) number of conditions to be checked
Q20.	An 'if' condition inside another 'if' is called ___ a) Second if b) nested if c) another if d) None of the above
Ans	b) nested if
Q21.	____ is an empty statement in Python. a) Jump b) Fail c) Empty d) Pass
Ans	d) Pass
Q22.	Which of the following symbol is used to end an 'if' statement in Python? a) Comma(,) b) Colon(:) c) Semi Colon(;) d) None of the above
Ans	b) Colon(:)
Q23.	Repetition of a set of statements in a program is made possible using _____ a) Selection Constructs b) Sequential Constructs c) Looping Constructs d) None of the above
Ans	c) Looping Constructs
Q24.	The statements in a loop are executed repeatedly as long as particular condition _____. a) remains False b) remains True c) gives error d) None of the above
Ans	b) remains True

Q25.	When the condition in loops becomes false, the loop _____ a) terminates b) begin c) restart d) none of the above
Ans	a) terminates
Q26	Consider the loop given below: for i in range(7,4,-2) : break What will be the final value of i after this loop? a) 4 b) 5 c) 7 d) -2
Ans	b) 7
Q27	Consider the loop given below: for i in range(10,5,-3) : print(i) How many times will this loop run? a) 3 b) 2 c) 1 d) Infinite
Ans	b) 2
Q28	Consider the loop given below: for i in range(3) : pass What will be the final value of i after this loop? a) 0 b) 1 c) 2 d) 3
Ans	c) 2
Q29	Consider the loop given below: for i in range(2,4) : print(i) What value(s) are printed when it executes? a) 3 b) 3 and 4 c) 2 and 3 d) 2,3 and 4
Ans	c) 2 and 3
Q30	Function range(3) is equivalent to: a) range(1,3) b) range(0,3) c) range(3,0,-1) d) range(1,3,0)
Ans	b) range(0,3)
Q31.	Suppose L=[10,20,30,40,50,60] , then what is the value of L[::2]?
Ans	[10, 30, 50]
Q32.	If L1=[‘a’,’b’,’c’] then find 2*L1
Ans	['a', 'b', 'c', 'a', 'b', 'c']
Q33.	Consider a list LST=[2,3,[1,5]] . Find the output of the statement: 1 in LST
Ans	False.

Q34.	If L=list('123') then find the output of the statement : print(L)
Ans	['1','2','3']
Q35.	If List1=[['a','b','c'],[10,20,30]] then find the value of len(List1)
Ans	2
Q36.	Consider a list LST=[10,20,30,40]. Write a statement to insert element 50 at the last position.
Ans	LST.append(50)
Q37.	Consider a list LST123=[1,2,3,4]. Write a statement to insert element 2.5 at index no 3.
Ans	LST123.insert(3, 2.5)
Q38.	If LST = 'SUMMER' then find LST[::-1]
Ans	REMMUS
Q39.	Write a ststement to create an empty list.
Ans	L=[] or L=list( )
Q40.	Which of the following function is a standard library function and not a list function? a. pop( ) b. max( ) c. extend( ) d. sort( )
Ans	b. max( )
Q41	Which function is used to merge two lists into a single list?
Ans	extend( )
Q42	Which operator will be used to make a copy of a list to another list? a. = b. == c.+ d.*
Ans	a.=
Q43	Write the result of the statement : print(list(range(5))
Ans	[0,1,2,3,4]
Q44	Suppose a list L=[1,2,3,4,5]. Write a statement to remove all the elements a make an empty list, i.e, L=[]
Ans	L.clear()
Q45	Find the output: - L=[0,[9,'a'],77.9,'KVS',['Rahul','Viki','Vijay]] print(L[:3]+L[1::-1])
Ans	[0, [9, 'a'], 77.9, [9, 'a'], 0]
Q46.	Which of the following is correct way of creating a dictionary? a) Medals={'Gold'=12,'Silver'=21,'Bronze'=32} b) Medals={'Gold':12,'Silver':21,'Bronze':32} c) Medals=['Gold':12,'Silver':21,'Bronze':32] d) Medals=('Gold':12,'Silver':21,'Bronze':32)
Ans	b) Medals={'Gold':12,'Silver':21,'Bronze':32}
Q47.	Dictionary is a _____ a) Set b) Sequence c) Mapping d) None of the options
Ans	c) Mapping
Q48.	Which one of the following statement is not True? a) Dictionary is value mutable. b) Dictionary is key immutable. c) Dictionary is a mapping. d) Dictionary is an ordered set of items.
Ans	d) Dictionary is an ordered set of items.
Q49.	Find out the odd one from the following: a) Integer b) String c) Float d) Dictionary
Ans	d) Dictionary

Q50.	Which of the following statement is wrong? a) D={1:2,3:4,4:5} b) D={[1,2]:'Tarun',[3,5]:'Komal',[4,6,7]:'Sampreet'} c) D=dict({1:'Madhu',2:'Karan',3:'Mohan'}) d) D={'Tarun': [1,2],'Komal': [3,5],'Sampreet': [4,6,7]:}
Ans	D={[1,2]:'Tarun',[3,5]:'Komal',[4,6,7]:'Sampreet'}
Q51.	T20Cricketer={'Name':'Virat', 'Runs':2794, 'Age':31} Barun is trying to delete all the key value pairs of the dictionary using various methods. Which of the following statement will not full fill his wish? a) T20Cricketer.clear() b) del T20Cricketer['Name'], T20Cricketer['Runs'], T20Cricketer['Age'] c) T20Cricketer=dict() d) del T20Cricketer
Ans	del T20Cricketer
Q52.	Predict the output of the following code: T20Cricketer={'Name':'Virat', 'Runs':2794, 'Age':31} print('Virat' in T20Cricketer) a) False b) True c) Error d) 'Virat'
Ans	a) False
Q53.	Predict the output of the following code: Marks={'Amar':87,'Neel':45,'Rupsa':92} print(len(Marks)) a) 6 b) 3 c) 5 d) Error
Ans	b) 3
Q54.	Predict the output of the following code: Marks={'Amar':87,'Neel':45,'Rupsa':92} for i in Marks: print(i, end=' ') a) 'Amar' 'Neel' 'Rupsa' b) 87 45 92 c) 87 45 92 d) 'Amar' 'Neel' 'Rupsa'
Ans	a) 'Amar' 'Neel' 'Rupsa'
Q55.	Predict the output of the following code: T20Cricketer={'Name':'Virat', 'Runs':2794, 'Age':31} T20Cricketer2={'Name': 'Rohit', 'Age': 33, 'Country': 'India'} T20Cricketer.update(T20Cricketer2) print(T20Cricketer) print(T20Cricketer2) a) {'Name': 'Rohit', 'Runs': 2794, 'Age': 33} {'Name': 'Rohit', 'Age': 33, 'Country': 'India'} b) {'Name': 'Virat', 'Runs': 2794, 'Age': 31, 'Country': 'India'} {'Name': 'Rohit', 'Age': 33, 'Country': 'India'} c) {'Name': 'Rohit', 'Runs': 2794, 'Age': 33, 'Country': 'India'} {'Name': 'Rohit', 'Age': 33, 'Country': 'India'} d) {'Name': 'Rohit', 'Age': 33, 'Country': 'India'} {'Name': 'Rohit', 'Runs': 2794, 'Age': 33, 'Country': 'India'}

Ans	c) {'Name': 'Rohit', 'Runs': 2794, 'Age': 33, 'Country': 'India'} {'Name': 'Rohit', 'Age': 33, 'Country': 'India'}
20 Assertion and reason Based question (1 Mark)	
Mark the correct choice as (a) Both A and R are true and R is the correct explanation for A (b) Both A and R are true and R is not the correct explanation for A (c) A is True but R is False (d) A is false but R is True	
Q1.	Assertion (A): We cannot change the value of an integer variable. Reasoning (R)**:** Integer is immutable.
Ans	(a)
Q2.	Assertion (A): Comments provide extra information in a program. Reasoning (R)**:** Comments are not executed.
Ans	(b)
Q3.	Assertion (A): Strings can be multi-line or single line. Reasoning (R)**:** Strings are mutable.
Ans	(c)
Q4.	Assertion (A): Interactive mode can be used for testing small lines of code. Reasoning (R)**:** It executes the lines of code in an interactive manner.
Ans	(a)
Q5.	Assertion (A): Bug is any error in a program. Reasoning (R)**:** Debugging is the process of removal of error in a program.
Ans	(b)
Q6.	**Assertion.(A)** Python's pass statement is an empty statement **Reason(R)**. An empty statement does nothing
Ans	(a)
Q7.	**Assertion. (A)** The flow of control in a program can occur sequentially, selectively or iteratively. **Reason. (R)**. The sequence construct means that the statement will get executed sequentially.
Ans	(b)
Q8.	**Assertion. (A)** Python statement 'if' represents selection construct. **Reason. (R)**. The selection construct means the execution of a set of statements, depending upon the outcome of a condition.
Ans	(a)
Q9.	**Assertion. (A)** The for loop is a counting loop that works with sequences of values. **Reason. (R)**. The range( ) function generates a sequence of list type.
Ans	(b)
Q10.	**Assertion. (A)** Both break and continue are jump statement **Reason. (R)**. Both break and continue can stop the loops and hence can substitute one another.
Ans	(c)

Q11.	Assertion (A): List can be changed after creation. Reason (R): List are mutable.
Ans	Option a.
Q12.	Assertion (A): remove( ) method removes all elements from a list Reason (R): len ( ) function is used to find the length of list
Ans	d. A is false but R is true.
Q13.	Assertion (A): Elements of a list are separated by comma. Reason (R): List is enclosed by a pair of straight brackets.
Ans	b. Both A and R are true but R is the not correct explanation of A.
Q14.	Assertion (A): clear( ) method removes all elements from a list Reason (R): sort ( ) function is used sort a list in descending order
Ans	c. A is true but R is false.
Q15.	Assertion (A): append( ) method is used to add an element at the end of a list Reason (R): extend ( ) function is used to merge two lists into a single list
Ans	b. Both A and R are true but R is the not correct explanation of A.
Q16.	Assertion (A): Dictionaries are mutable data type. Reasoning (R): We can change the values of the dictionaries.
Ans	(a) Both (A) and (R) are true and (R) is the correct explanation for (A).
Q17.	Assertion (A): Dictionaries are mutable data type. Reasoning (R): We cannot change the keys of the dictionaries.
Ans	(b) Both (A) and (R) are true and (R) is not the correct explanation for (A).
Q18.	Assertion (A):Items in dictionaries are unordered. Reasoning (R):Internally, the key: value pairs of a dictionary are associated with one another with some internal function (called hash-function). This way of linking is called mapping.
Ans	(a) Both (A) and (R) are true and (R) is the correct explanation for (A).
Q19.	Assertion (A): We can update values of a dictionary by the help of keys. Reasoning (R):It is not necessary that the key has to present in the dictionary.
Ans	(c) (A) is true but (R) is false.
Q20.	Assertion (A): We can add new key, value pairsto a dictionary. Reasoning (R): Key to be added must not exist in dictionary and must be unique. If the Key already exist, then it will change the value of existing key and no new entry will be added to dictionary.
Ans.	(a) Both (A) and (R) are true and (R) is the correct explanation for (A).
20 Short Knowledge/Understanding/Application Based Questions (2 Marks)	
Q1.	Write any four rules for naming an identifier.
Ans	(a) It should not be a reserved word (b) It can start with an alphabet or underscore. (c) It cannot contain any special character (d) It can contain digits but not in the starting position.

Q2. State any two differences between '=' and '= ='.

Ans

=	= =
Assignment operator	Relational operator
No return value.	Returns True / False.

Q3. State any two types of operators with example.

Ans Logical operator – and, or, not

Arithmetic operator - +, -, /, *

Q4. What is the difference between '/' and '//'.

Ans

/	//
Division operator	Floor division operator
E.g. 5 / 2 = 2.5	E.g. 5 // 2 = 2

Q5. Give two ways of writing multi-line strings.

Ans

Method 1	Method 2
s= "Hello \ Everyone"	s= ' ' ' Hello Everyone ' ' '

Q6. What is range() function? Give an example.

Ans The range() function returns a sequence of numbers, starting from 0 by default, and increments by 1 (by default), and stops before a specified number.
Syntax: range(start, stop, step)
Example:

```
x = range(3, 7)
for n in x:
  print(n)
```

Output:
3
4
5
6

Q7. What is the difference between break and continue

Ans

Basis for comparison	break	continue
Use	It is used for the termination of all the remaining iterations of the loop.	It is used for the termination of the only current iteration of the loop.
Control after using break/continue statement	The line which is just after the loop will gain control of the program.	The control will pass to the next iteration of that current loop by skipping the current iteration.
Causes	It performs the termination of the loop.	It performs early execution of the next loop by skipping the current one.

Q8. Write the output of the following code:

```
x=5
while(x<15):
      print(x**2)
      x+=3
```

Ans

```
25
64
121
196
```

Q9. Write the output of the following code:

```
val = 10
total = 0

for count in range(1,val,3):
   total = total + count
   if count % 2 == 0:
      print(count*10)
   else:
      print(count)
print (total)
```

Ans

```
1
40
7
12
```

Q10. Find errors in the following code and write the correct code after underlining it.

```
x = int(input(“Enter value”)
for k in range[0,20]
   if x=k
      print(x+k)
  else:
     Print(x-k)
```

Ans

```
x = int(input("Enter value"))
for k in range(0,20):
   if x==k:
     print(x+k)
   else:
     print(x-k)
```

<table>
<tr><td>Q11.</td><td>Predict the output:-
L1, L2=[1,2,3],[1,2,3]
L3=[1,[2],3]
print(L1==L2)
print(L2==L3)</td></tr>
<tr><td>Ans</td><td>True
False</td></tr>
<tr><td>Q12.</td><td>What is the difference between pop(index) and pop( ) function?</td></tr>
<tr><td>Ans</td><td>pop(index) function deletes the element from i th index of the list.
pop( ) function deletes the last element from the list.</td></tr>
<tr><td>Q13.</td><td>What is the difference between remove( ) and pop( ) function?</td></tr>
<tr><td>Ans</td><td>The argument of pop( ) function is an index. It deletes the element from the given index of the list.
The argument of delete( ) function is an element. It deletes the first occurrence element from the list.</td></tr>
<tr><td>Q14.</td><td>Predict the output of the following code fragment:-
values =[ ]
for i in range (1,4):
values.append(i)
print(values)</td></tr>
<tr><td>Ans</td><td>[1,2,3]</td></tr>
<tr><td>Q15.</td><td>Predict the output of the following code:-
a=[4,3,2,5,6]
print(a[:-3:-1])
print(a[-3:4])</td></tr>
<tr><td>Ans</td><td>[6, 5]
[2, 5]</td></tr>
<tr><td>Q16.</td><td>Write a python statement to create a dictionary ‘Marks5Subs’ having following items: (Please don’t consider the column headers)
<table>
<tr><td>Name</td><td>Marks of 5 Subjects</td></tr>
<tr><td>Sawan</td><td>67,74,56,48,87</td></tr>
<tr><td>Ankit</td><td>34,46,39,21,41</td></tr>
<tr><td>Puja</td><td>91,87,73,82,95</td></tr>
<tr><td>Arnab</td><td>78,98,97,95,99</td></tr>
</table></td></tr>
<tr><td>Ans</td><td>Marks5Subs={'Sawan':[67,74,56,48,87],'Ankit':[34,46,39,21,41],
'Puja':[91,87,73,82,95],'Arnab':[78,98,97,95,99]}</td></tr>
<tr><td>Q17.</td><td>Write a python statement to create a dictionary ‘Currency’ having following items: (Please don’t consider the column headers)
<table>
<tr><td>Country</td><td>Currency</td></tr>
<tr><td>India</td><td>Indian Rupee</td></tr>
<tr><td>Russia</td><td>Ruble</td></tr>
<tr><td>USA</td><td>Dollar</td></tr>
<tr><td>Japan</td><td>Yen</td></tr>
</table></td></tr>
<tr><td>Ans</td><td>Currency={'India':'Indian Rupee','Russia':'Ruble',
'USA':'Dollar','Japan':'Yen'}</td></tr>
</table>

Q18. Write a python statement to create a dictionary 'NationalBird' having following items:
(Please don't consider the column headers)

Country	National Bird
India	Peacock
Australia	Emu
Bahamas	Flamingo
Italy	Sparrow
New Zealand	Kiwi

Ans
```
NationalBird={'India':'Peacock','Australia':'Emu','Bahamas':'Flamingo',
                'Italy':'Sparrow','New Zealand':'Kiwi'}
```

Q19. Ranit has written a python code to create a dictionary and display the values of the dictionary using a loop but it is showing errors. Help him to find out errors and underline the corrections.
```
Stds={'IX';153,'X';143,'XI';147,'XII';89}
for i in Std:
   Print(i)
```

Ans
```
Stds={'IX':153,'X':143,'XI':147,'XII':89}
for i in Stds:
   print(Stds[i])
```

Q20. Sharmili has written a python code to create a dictionary Stds that stores student's strength of classes IX, X, XI and XII and it will calculate the total student's strength it is showing errors, Help her to find out errors and underline the corrections.
```
Stds={'IX':153,'X':143,'XI':147,'XII':89
Sum=1
for i in Stds.value():
   Sum=+i
print(Sum)
```

Ans.
```
Stds={'IX':153,'X':143,'XI':147,'XII':89}
Sum=0
for i in Stds.values():
   Sum+=i
print(Sum)
```

20 Short Knowledge/Understanding/Application Based Questions (3 Marks)

Q1. What is data type conversion? State its two types with example.

Ans
Conversion of one data type to another is known as data type conversion.

Two types - implicit and explicit(type casting).

Implicit - 5 / 2 = 2.5

Explicit - int(3.25) → 3

Q2. Define Dynamic Typing. Give an example.

Ans
The value allotted to a variable can be changed dynamically in a program.

E.g.:

```
a=10
print(a)
a="Hello"   # changing the value of the variable
```

Q3. Using example, explain the difference between mutable and immutable datatype.

Ans
If the value of variable of a data type can be changed without affecting its address then it is known as mutable data type, else it is known as immutable data type.

Q4.	What is the use of comments in a program ? What are its two types ?
Ans	Comments provide extra information for increasing the readability of a program. Two types - single line comment and multi-line comment.
Q5.	What do you mean by the precedence of operators ?
Ans	Operator precedence affects how an expression is evaluated. For example, x = 7 + 3 * 2; here, x is assigned 13, not 20 because operator * has higher precedence than +, so it first multiplies 3*2 and then adds into 7.
Q6.	Write a program to find the sum of the given series. 1 + x^2/2 + x^3/3 + … x^n/n
Ans	n=int(input("Enter the number of terms:")) x=int(input("Enter the value of x:")) sum1=1 for i in range(2,n+1): sum1=sum1+((x**i)/i) print("The sum of series is",round(sum1,2))
Q7.	Write a program to reverse a number using while loop.

Ans	num = int (input (“Enter a number: “))
	reversed_num = 0
	while num != 0:
	  digit = num % 10
	  reversed_num = reversed_num * 10 + digit
	  num = num/10
	print("Reversed Number: " + str(reversed_num))

Q8.	Write a program to calculate the factorial of a number.

Ans	n = int (input (“Enter a number: “))
	factorial = 1
	if n >= 1:
	  for i in range (1, n+1):
	  factorial = factorial *i
	print (“Factorial of the given number is: “, factorial)

Q9.	Write a program to check whether the number entered by the user is Perfect number.

Ans	n = int(input("Enter any number: "))
	sum1 = 0
	for i in range(1, n):
	  if(n % i == 0):
	  sum1 = sum1 + i
	if (sum1 == n):
	  print("The number is a Perfect number!")
	else:
	  print("The number is not a Perfect number!")

Q10.	Write a program to print the given pattern. * * * * * * * * * * * * * * *

Ans	for i in range(1, 6):
	  for j in range(1, i+1):
	  print(‘*’, end = " ")
	  print()

Q11.	Write a program to find the average from a given list of integers.
Ans	L=[5,8,3,4,6] sum=0 for i in L: sum+=i avg=sum/len(L) print(avg)

Q12.	Predict the output of the following code:-
	M=[]
	M1=[]
	M2=[]
	for i in range(1,10):
	  M.append(i)
	for i in range(10,1,–2):
	  M1.append(i)
	for i in range(len(M1)):
	  M2.append(M1[i]+M[i])
	M2.append(len(M)-len(M1))
	  print(M2)

Ans	[11, 10, 9, 8, 7, 4]
Q13.	What is the difference between sort( ) and sorted( ) function?
Ans	sort( ) function will modify the list from which the function has been called while sorted( ) function will create a new list which is given as argument. sort( ) function works upon list onlt while sorted( ) function will work upon any iterative sequence.
Q14.	Predict output of the following code:- for Name in ['Jayes', 'Ramya', 'Taruna', 'Suraj'] : print(Name) if Name[0]=='T': break else : print('Finished!') print('Got it!')
Ans	Jayes Finished! Got it! Ramya Finished! Got it! Taruna
Q15.	Write a program that takes first 5 and last 5 elements of a list and stores them into another list.

Ans	L=[1,1,2,3,5,4,7,9,5,4,9,6]
	if len(L)<10:
	  print("Insufficient elements")
	else:
	  LST=L[:5]+L[-5:]
	  print(L)
	  print(LST)

Q16.	Consider the following Dictionary. Capital={'India':'New Delhi', 'Iran':'Teheran', 'Nepal':'Kathmandu', 'Russia':'Moscow'} Write statements to do the following: a) To insert a new item for the country Japan. b) To display name of the countries from the dictionary Capital. c) To display name of the capitals from the dictionary Capital.
Ans	a) Capital['Japan']='Tokyo' b) print(Capital.keys()) c) print(Capital.values())
Q17.	Consider the following Dictionary. Goals2023={‘Messi’:26,’Ronaldo’:35,‘Haaland’:25,’Neymar’:20} Write statements to do the following: a) To modify the Goals of Neymar as 18. b) To delete the record of Haaland. c) To display the goals of Ronaldo.
Ans	a) Goals2023['Neymar']=18 b) del Goals2023['Haaland'] c) print(Goals2023[‘Ronaldo’])
Q18.	Write a python program to store details of five teachers having Employee ID, Name and Designation to a dictionary and display only the details of those teachers whose name starts with ‘R’ and designation is ‘PGT’.

Ans	Teacher={'Emp1':{'EmpId':3698,'Name':'Rabi','Desig':'PGT'},
	'Emp2':{'EmpId':9821,'Name':'Sachin','Desig':'PRT'},
	'Emp3':{'EmpId':8219,'Name':'Ruksana','Desig':'TGT'},
	'Emp4':{'EmpId':2195,'Name':'Martin','Desig':'TGT'},
	'Emp5':{'EmpId':1975,'Name':'Robin','Desig':'PGT'}}
	for i in Teacher.values():
	if i['Name'][0]=='R' and i['Desig']=='PGT':
	print(i)

Q19.	Predict the output of the following code:
	Goals2023={'Messi':26,'Ronaldo':35,'Haaland':25,'Neymar':20}
	for i in Goals2023:
	if len(i)>6:
	print(i)
	for i in Goals2023:
	if Goals2023[i]>25:
	print(i,Goals2023[i])
	for i in Goals2023:
	if Goals2023[i]%2==0:
	print(i,Goals2023[i])

Ans	Ronaldo Haaland Messi 26 Ronaldo 35 Messi 26 Neymar 20
Q20.	Soham wants to write a Python Code to calculate frequency of each distinct element of a list but he is struggling at some points help him to complete the code. Example: Input: [12, 34, 21, 45, 21, 45, 12, 21, 32, 21, 21] Output: {12: 2, 34: 1, 21: 5, 45: 2, 32: 1}

	Code:
	L=[12,34,21,45,21,45,12,21,32,21,21]
	D={}
	for _____: #Statement 1
	  if i_____D: #Statement 2
	  _____ #Statement 3
	  else:
	  D[i]+=1
	print(L)
	print(D)
	a) Complete Statement 1 to traverse each element of the list one by one.
	b) Complete Statement 2 to check whether i is not present in D as keys.
	c) Complete Statement 3 to insert an entry for i in D with appropriate value.

Ans.	a) Statement 1: for i in L: b) Statement 2: if i not in D: c) Statement 3: D[i]=1
20 Short Knowledge/Understanding/Application Based Questions (4 Marks)	

Q1.	Vedansh is a Python programmer working in a school. He has written the following code, but it contains mistakes.
	
	n1=Int (input ("Enter the number)) # statement 1
	2n=int (input ("Enter the number")) # statement 2
	rem= n1 % n2 # statement 3
	print("rem") # statement 4
	As a Python expert, help him by answering the following questions:
	(a) Identify the statements that don't contain any errors.
	(b) Write the correct code for the statements containing error.
	(c) Which type of operator is being used in statement 3.
	(d) What will be the output if the input is 10 and 6 respectively for n1 and n2.

Ans	(a) statement 3
	(b) n1=int (input ("Enter the number")) # statement 1
	n2=int (input ("Enter the number")) # statement 2
	print(rem) # statement 4
	(c) Arithmetic operator
	(d) 4

Q2.	Soham has chosen the following names for some variables, give reasons why they are invalid (a) 1sum (b) sum@ (c) sum of num (d) class
Ans	(e) 1sum - starts with digit (f) sum@ - contains special character '@' (g) sum of num - contains space (h) class - keyword

Q3. Rohan is trying to guess the size of following strings , help him to do so:

(a) '\n'	(b) "Ram's"
(c) " " " Hi All " " "	(d) "Hi \ All"

Ans (a) 1 (b) 5 (c) 6 (d) 5

Q4. Find the output of the following code:

```
a,b,c=10,20,30
a,c,b=b-5,a-3,c-6
print(a,b,c)
```

Ans 15 24 7

Q5. Find the output of the following code snippets:

(a) type('None') (b) type(None)

(c) print(print("OK")) (d) type(0o56)

Ans (a) string (b) None (c) None (d) int

Q6. What do you mean by looping construct in Python? Explain for loop and while loop with their syntax and appropriate examples.

Ans The looping construct means repetition of a set of statements on the basis of a condition test. Furthermore, till the time a condition turns out to be true or false depending upon the loop, the repetition of a set of statements takes place again and again.

for loop

A for loop is a type of loop that runs for a preset number of times. It also has the ability to iterate over the items of any sequence, such as a list or a string.

Syntax

```
for i in <collection>:
  <loop body>
```

Example

```
for i in range(10):  # collection of numbers from 0 to 9
   print(i)
```

Here, collection is a list of objects. The loop variable, i, takes on the value of the next element in collection each time through the loop. The code within loop body keeps on running until i reach the end of the collection.

while loop

With the while loop, we can execute a block of code as long as a condition is true.

Syntax

```
while <condition>:
  <loop body>
```

In a while loop, the condition is first checked. If it is true , the code in loop body is executed. This process will repeat until the condition becomes false.

This piece of code prints out integers between 0 and 9 .

Example

```
n = 0
while n < 10: # while n is less than 10,
   print(n) # print out the value of n
   n += 1 #
```

Q7.	What do you mean by jumping statements in Python? Explain break, continue and pass with appropriate examples.

Ans	In Python, jumping statements are used to control the flow of a program by altering the normal execution sequence. They allow you to change the order in which statements are executed in a loop or conditional block. The three common jumping statements in Python are break, continue, and pass.
	break:
	The break statement is used to exit the current loop prematurely, whether it's a for loop or a while loop.
	It is typically used when a certain condition is met, and you want to terminate the loop immediately.
	Example:
	for i in range(1, 6):
	  if i == 3:
	  break # This will exit the loop when i is equal to 3
	  print(i)
	continue:
	The continue statement is used to skip the current iteration of a loop and proceed to the next iteration.
	It is often used when you want to skip some specific values or conditions but continue with the loop.
	Example:
	for i in range(1, 6):
	  if i == 3:
	  continue # This will skip iteration when i is equal to 3
	  print(i)
	pass:
	
	The pass statement is a placeholder statement that does nothing. It is often used as a placeholder when you need a statement syntactically but don't want to execute any code.
	Example:
	for i in range(1, 4):
	  if i == 2:
	  pass # This will do nothing when i is equal to 2
	  else:
	  print(i)

Q8.	Write a program to check if input number is a prime number.

Ans	num = int(input("Enter a number: "))
	if num > 1:
	  # check for factors
	  for i in range(2,num):
	  if (num % i) == 0:
	  print(num,"is not a prime number")
	  break
	  else:
	  print(num,"is a prime number")
	# if input number is less than
	# or equal to 1, it is not prime
	else:
	  print(num,"is not a prime number")

Q9.	Write a program to check whether a year is leap year or not.

Ans	input_year = int(input("Enter the Year to be checked: "))
	if ((input_year%400 == 0) or ((input_year%4 == 0) and (input_year%100 != 0))):
	  print("%d is Leap Year" %input_year)
	else:
	  print("%d is Not the Leap Year" %input_year)

Q10.	Write a program to display the Fibonacci series upto nth term.

Ans	#Python program to generate Fibonacci series until 'n' value
	n = int(input("Enter the value of 'n': "))
	a = 0
	b = 1
	sum = 0
	count = 1
	print("Fibonacci Series: ", end = " ")
	while(count <= n):
	  print(sum, end = " ")
	  count += 1
	  a = b
	  b = sum
	  sum = a + b

Q11.	Predict the output of the following code:-
	  Moves=[11, 22, 33, 44]
	  Queen=Moves
	  Moves[2]+=22
	  L=len(Moves)
	  for i in range (L):
	  print (“Now@”, Queen[L-i-1], “#”, Moves [i])

Ans	Now@ 44 # 11 Now@ 55 # 22 Now@ 22 # 55 Now@ 11 # 44
Q12.	Write a program to count positive numbers, negetive numbers and zeroes from a list of integers. The list elements will be entered by the user.

Ans	L=[]
	p,n,z=0,0,0
	s=int(input("Enter size of the list:"))
	for i in range(s):
	  x=int(input("Enter element:"))
	  L.append(x)
	  if x>0:
	  p=p+1
	  elif x<0:
	  n=n+1
	  else:
	  z=z+1
	print(L)
	print("Postive Numbers=",p)
	print("Negative Numbers=",n)
	print("Zeroes=",z)

Q13.	Write a program to input a list and an element and remove all occurences of the given element from the list.
Ans	Lst=eval(input(“Enter a list”)) item=int(input(“Enter thr item to remove”)) c=Lst.count(item) if c==0:

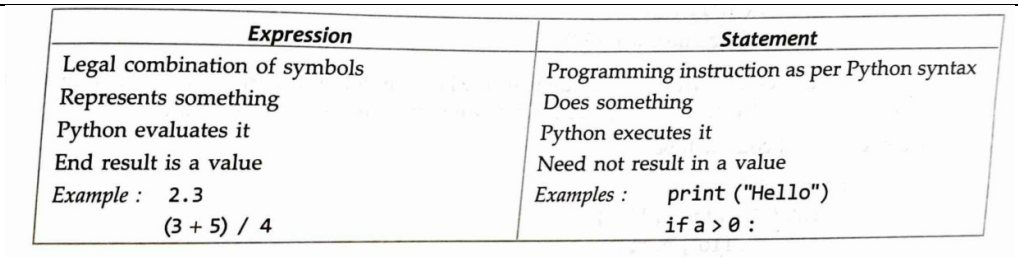
	print("Item not found")
	else:
	while(c>0):
	i=Lst.index(item)
	Lst.pop(i)
	c-=1
	print(Lst)

Q14.	Given a list of integers, write a program to sum of even mumbers and odd numbers.

Ans	L=[5,8,9,7,5,4]
	sumeven, sumodd=0,0
	for i in L:
	if i%2==0:
	sumeven+=i
	else:
	sumodd+=i
	print(L)
	print("Sum of even Numbers=",sumeven)
	print("Sum of odd Numbers=",sumodd)

Q15.	Identify the operators along with their names from the following statements:- a. 5 in [1,2,3,4,5] b. [1,2,3]*2 c. [1,2,3,4,5][1:3] d. [1,2,3]+[4,5]
Ans	a. in – membership operator b. * - replication operator c. : - slice operator d. + - concatenation operator
Q16.	Predict the output of the following code: Teacher1,Teacher2={'EmpId':3698,'Name':'Robin','Desig':'PGT', 'Sub':'Chemistry'},{'EmpId':9821, 'Name':'Sachin','Desig':'PRT','HomeTown':'Patna'} print(Teacher1) print(Teacher2) Teacher1.update(Teacher2) print(Teacher1) print(Teacher2)
Ans	{'EmpId': 3698, 'Name': 'Robin', 'Desig': 'PGT', 'Sub': 'Chemistry'} {'EmpId': 9821, 'Name': 'Sachin', 'Desig': 'PRT', 'HomeTown': 'Patna'} {'EmpId': 9821, 'Name': 'Sachin', 'Desig': 'PRT', 'Sub': 'Chemistry', 'HomeTown': 'Patna'} {'EmpId': 9821, 'Name': 'Sachin', 'Desig': 'PRT', 'HomeTown': 'Patna'}
Q17.	Predict the output of the following code: Marks5Subs={'Sawan':[67,74,56,48,87],'Ankit':[34,46,39,21,41], 'Puja':[91,87,73,82,95],'Arnab':[78,98,97,95,99]} print(max(Marks5Subs['Sawan'])) print(min(Marks5Subs['Ankit'])) print(len(Marks5Subs['Arnab'])) print(len(Marks5Subs))
Ans	87 21 5 4

Q18.	Predict the output of the following code: Age={'Sawan':67,'Ankit':34,'Puja':21,'Arnab':23} print(list(Age.items())) del Age['Sawan'] print(Age) Age.clear() print(Age) del Age print(Age)
Ans	[('Sawan', 67), ('Ankit', 34), ('Puja', 21), ('Arnab', 23)] {'Ankit': 34, 'Puja': 21, 'Arnab': 23} {} NameError: name 'Age' is not defined
Q19.	Predict the output of the following code: Result={'PT1':{'Suresh':35,'Kabir':29,'Lisa':17,'Hina':36}, 'HYE':{'Suresh':87,'Kabir':56,'Lisa':87,'Hina':65}, 'PT2':{'Suresh':37,'Kabir':23,'Lisa':27,'Hina':33}, 'SEE':{'Suresh':78,'Kabir':65,'Lisa':89,'Hina':75}} T_Suresh=T_Kabir=T_Lisa=T_Hina=0 for i in Result: T_Suresh+=Result[i]['Suresh'] T_Kabir+=Result[i]['Kabir'] T_Lisa+=Result[i]['Lisa'] T_Hina+=Result[i]['Hina'] print(T_Suresh) print(T_Kabir) print(T_Lisa) print(T_Hina)
Ans	237 173 220 209
Q20.	Predict the output of the following code: Teacher1=Teacher2={'EmpId':3698,'Name':'Robin','Desig':'TGT'} Teacher1['Desig']='PGT' Teacher2['Sub']='CS' print(Teacher1) print(id(Teacher1)) print(Teacher2) print(id(Teacher2))
Ans.	{'EmpId': 3698, 'Name': 'Robin', 'Desig': 'PGT', 'Sub': 'CS'} 50519352 {'EmpId': 3698, 'Name': 'Robin', 'Desig': 'PGT', 'Sub': 'CS'} 50519352
15 Case Based Questions (5 Marks)	
Q1.	Namita is trying to understand the concept of literal, help him by answering the following questions: (a) what is literal (b) state any two types of literals (c) Name the special literal (d) give an example of integer literal (e) what is Boolean literal ?

Ans	(a) Literal represents a value of a particular data type (b) string literal and boolean literal. (c) None (d) 527 (e) True / False
Q2.	Rakesh is unable to understand the difference between statement and expression, write differences between them along with examples.
Ans	
Q3.	Shilu has to write a program to accept the name of a person and greet him/her in the following manner: Hello <name>, welcome to our class. Help Shilu to write the program.
Ans	n=input("Enter the name:") print("Hello",n, "welcome to our class")
Q4.	Write a program to accept two numbers and print their sum in the following manner: The sum of <n1> and <n2> is <n1+n2>.
Ans	n1=int(input("Enter the number:")) n2=int(input("Enter the number:")) print("The sum of" ,n1," and ", n2," is",n1+n2)
Q5.	Find the output of the following: (a) " " and "Hello" (b) 2 and 4 (c) 'a' or 'b' (d) True and 'Hi' (e) 0 or 5
Ans	(f) " " and "Hello" → "Hello (g) 2 and 4 → 4 (h) 'a' or 'b' → a (i) True and 'Hi' → Hi (j) 0 or 5 - 5

Q6. Mr. Aakash wants to calculate electricity charges based on the number of consumed electricity units and other charges. Write a program in Python to generate electricity bill as per the following conditions.

i. If unit consumed <= 100 then cost per unit is Rs 3.46
ii. If unit consumed >= 101 and <= 300 then cost per unit is Rs 7.43
iii. If unit consumed >= 301 and <= 500 then cost per unit is Rs 10.32
iv. If unit consumed >= 501 then the cost per unit is Rs 11.71
v. Line rent is Rs 1.45 per unit.
vi. Additional fixed Meter rent is Rs 100.
vii. The tax on the bill is 16 percent which can be taken as 0.16.

Ans

```
unit = int(input("Enter your unit: "))
if unit <= 100:
   bill = unit * 3.46
elif unit >= 101 and unit <= 300:
   bill = 346 + ((unit - 100) * 7.43)
elif unit >= 301 and unit <= 500:
   bill = 346 + 1486 + ((unit - 300) * 10.32)
else:
   bill = 346 + 1486 + 2064 + ((unit - 500) * 11.71)
print("Bill Per Unit:",bill)
bill = bill + (unit*1.45)
print("Bill after adding Line rent:",bill)
bill = bill + 100
print("Bill after adding Meter rent:",bill)
bill = bill + (bill*0.16)
print("Total Bill after adding tax:",bill)
```

Q7. Mr. Ravi is a class teacher in Modern Public School. He wants to determine the student's grade based on the results of five subjects and the criteria given below.

Average Mark	**Grade**
91-100	A1
81-90	A2
71-80	B1
61-70	B2
51-60	C1
41-50	C2
33-40	D
21-32	E1
0-20	E2

Write an appropriate program in Python to find out the grade of a student.

Ans

```
print("Enter Marks Obtained in 5 Subjects: ")
markOne = int(input())
markTwo = int(input())
markThree = int(input())
markFour = int(input())
markFive = int(input())
tot = markOne+markTwo+markThree+markFour+markFive
```

	avg = tot/5
	if avg>=91 and avg<=100:
	  print("Your Grade is A1")
	elif avg>=81 and avg<91:
	  print("Your Grade is A2")
	elif avg>=71 and avg<81:
	  print("Your Grade is B1")
	elif avg>=61 and avg<71:
	  print("Your Grade is B2")
	elif avg>=51 and avg<61:
	  print("Your Grade is C1")
	elif avg>=41 and avg<51:
	  print("Your Grade is C2")
	elif avg>=33 and avg<41:
	  print("Your Grade is D")
	elif avg>=21 and avg<33:
	  print("Your Grade is E1")
	elif avg>=0 and avg<21:
	  print("Your Grade is E2")
	else:
	  print("Invalid Input!")

Q8.	A list is a standard data type in Python that can store a sequence of values belonging to any type. Lists are enclosed in a pair of square brackets. These are mutable, i.e, elements can be changed by the user. Every element of a list has an index. Indexing begins from zero. Questions:- I.List defined within a list is called:- a. nested list b. super list c. sub list d. hidden list II. In Python, list is of type:- a. Immutable b. Mutable c. Both a & B d. None of a & b III. If a list contains n elements, then the index of the last element will be:- a. 0 b. n c. n+1 d. n-1 IV. Which type of the bracket is used to define a list? a. ( ) b. { } c. [ ] d. <> V. List can contain values of these types:- a. integers b. float c. string d. all of these
Ans	I. a II.b III.d IV.c V.d
Q9.	Amit has created two lists L1=[6,2,3,8] and L2=[1,5,4] He has been asked by his teacher to write the code for the following tasks:- I. To predict the output of the code:- L3=L2.extend(L1) print(L3) II. To display smallest number from L3 III.To add 2nd element from L1 and 3rd element from L2 IV. To arrange the elements of L3 in descending order V. To predict the output : L1[:2]+L2[2:]
Ans	I. [1,5,4,6,2,3,8] II. min(L3) III. L1[1] + L2[2] IV. L3.sort(reverse=True) V. [6,2,4]
Q10.	Rakesh wants to write a program to count the number of vowels from the word 'Alexander' by converting it into a list. But the program does not run due to errors. Help Rakesh to identify and rectify the errors so that program can run:- L=List('Alexander')

	count==0
	For i in L:
	  if i within 'aeiouAEIOU'
	  count=+1
	print(count)

Ans	L=list('Alexander')
	count=0
	for i in L:
	  if i in 'aeiouAEIOU'
	  count+=1
	print(count)

Q11.	Raman has stored record of a student in a list as follows:-
	  rec=[‘Thomas’,’C-25’,[56,98,99,72,69],78.8]
	Suggest him the Python statements to do the following tasks:-
	  a. To find the percentage
	  b. To find marks of 5th subject
	  c. Maximum marks of the student
	  d. To find total marks
	  e. To change the name from ‘Thomas’ to ‘ Charles’

Ans	a. rec[3] b. rec[2][4] c. max(rec[2]) d. rec[0]+rec[1]+rec[2]+rec[3]+rec[4] or sum(rec) e. rec[0]=‘Charles’

Q12.	Rehana has a list of both positive numebers. She has been given a task to separate positive and negetaive numbers into two different lists and finally to delete the original list. She has written a code where some statements incomplete. Complete the imcomplete statements by filling in the blanks:-
	Numbers=[5,-8,9,-7,5,-4]
	Pos, Neg= ____ #Statement 1: To initialize empty lists
	for i in range( ): # Statement 2: To write the range to access all elements
	  if Numbers[i]>=0:
	_____ # Statement 3: To add element in POS
	  else:
	_____ # Statement 4: To add element in another list
	_____ #Statement 5: To delete the original list
	print (Pos)
	print(Neg)
	print("Task Completed")

Ans	a. Statement 1: Pos, Neg=[],[] b. Statement 2: for i in range(len(Numbers)): c. Statement 3: Pos.append(Numbers[i]) d. Statement 4: Neg.append(Numbers[i]) e. Statement 5: del Numbers
Q13.	Write a menu driven program to store marks of students with the following features: Press 1 to add a new student’s record. Press 2 to update an existing student’s record. Press 3 to delete an existing student’s record who have taken TC Press 4 to display a particular student’s record. Press 5 to display records of all students Press 6 to exit
Ans	Record={} while True: print('Press 1 to add a new student’s record')

```
    print('Press 2 to update an existing student's record')
    print('Press 3 to delete an existing student's record who have taken TC')
    print('Press 4 to display a particular student's record')
    print('Press 5 to display records of all students')
    print('Press 6 to exit')
    op=int(input('enter the value'))
    if op==1:
        Name=input('Enter Name')
        Marks=int(input('Enter Marks'))
        Record[Name]=Marks
    elif op==2:
        Name=input('Enter Name')
        Marks=int(input('Enter Marks'))
        Record[Name]=Marks
    elif op==3:
        Name=input('Enter Name')
        del Record[Name]
    elif op==4:
        Name=input('Enter Name')
        print(Record[Name])
    elif op==5:
        print(Record)
    elif op==6:
        break
    else:
        print('Wrong Choice')
```

Q14. Write a menu driven program to show category wise student enrolment details of a KV with the following features.
Press 1 to add a new category.
Press 2 to update an existing category.
Press 3 to delete an existing category
Press 4 to display enrolment of a particular category.
Press 5 to display all category wise enrolment.
Press 6 to exit

Ans

```
Enrol={}
while True:
    print('Press 1 to add a new category')
    print('Press 2 to update an existing category')
    print('Press 3 to delete an existing category')
    print('Press 4 to display enrolment of a particular category')
    print('Press 5 to display all category wise enrolment')
    print('Press 6 to exit')
    op=int(input('enter the value'))
    if op==1:
        Cat=input('Enter Category')
        Tot=int(input('Enter enrolment under the Category'))
        Enrol[Cat]=Tot
    elif op==2:
        Cat=input('Enter Category')
        Tot=int(input('Enter enrolment under the Category'))
        Enrol[Cat]=Tot
    elif op==3:
        Cat=input('Enter Category')
```

```
        del Enrol[Cat]
    elif op==4:
        Cat=input('Enter Category')
        print(Enrol[Cat])
    elif op==5:
        print(Enrol)
    elif op==6:
        break
    else:
        print('Wrong Choice')
```

Q15. Write a menu driven program to simulate Bank Application with the following features:
Press 1 to open a savings bank account
Press 2 to deposit money
Press 3 to withdraw money
Press 4 to check balance
Press 5 to exit

Ans

```
Acc={}
AccNo=1000
while True:
    print('Press 1 to open a savings bank account')
    print('Press 2 to deposit money')
    print('Press 3 to withdraw money')
    print('Press 4 to check balance')
    print('Press 5 to exit')
    op=int(input('enter the value'))
    if op==1:
        Name=input('Enter Name')
        Age=int(input('Enter Age'))
        AccNo+=1
        Acc[AccNo]={'Name':Name,'Age':Age,'Bal':0}
    elif op==2:
        Ac=int(input('Enter Account No'))
        Amt=int(input('Enter the amount to be deposited'))
        for i in Acc:
            if i==Ac:
                Acc[i]['Bal']+=Amt
    elif op==3:
        Ac=int(input('Enter Account No'))
        Amt=int(input('Enter the amount to be deposited'))
        for i in Acc:
            if i==Ac:
                Acc[i]['Bal']-=Amt
    elif op==4:
        Ac=int(input('Enter Account No'))
        for i in Acc:
            if i==Ac:
                print(Acc[i])
    elif op==5:
        break
    else:
        print('Wrong Choice')
```

Name of the chapter : **Database concepts and the Structured Query Language**

Topic Covered

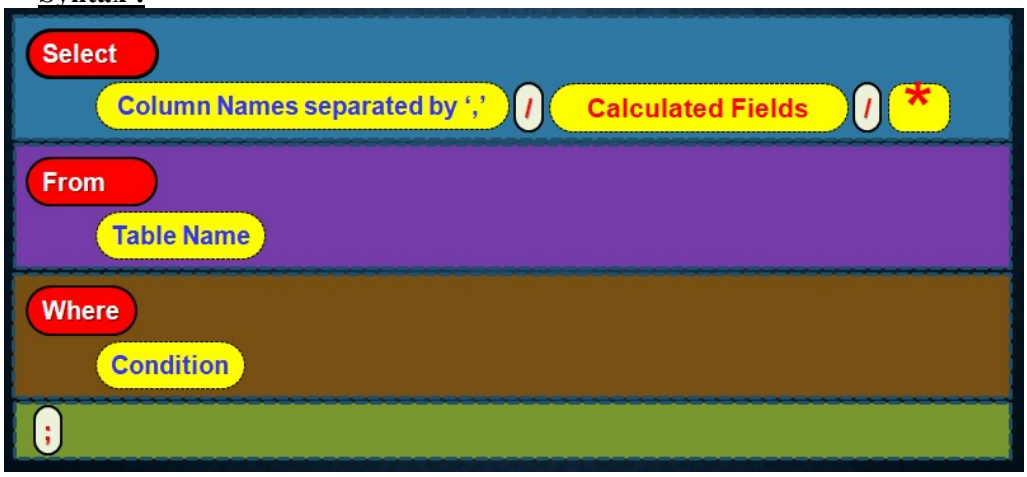
- Database Concepts: Introduction to database concepts and its need,Database Management System.
- Relational data model: Concept of domain, tuple,relation, candidate key, primary key, alternate key
- Advantages of using Structured Query Language, Data Definition Language, Data Query Language and Data Manipulation Language, Introduction to MySQL, Creating a database using MySQL,Data Types
- Data Definition:CREATE DATABASE, CREATE TABLE, DROP, ALTER
- Data Query: SELECT, FROM, WHERE with relational operators, BETWEEN, logical operators, IS NULL, IS NOT NULL
- Data Manipulation: INSERT, DELETE,UPDATE

Key Points

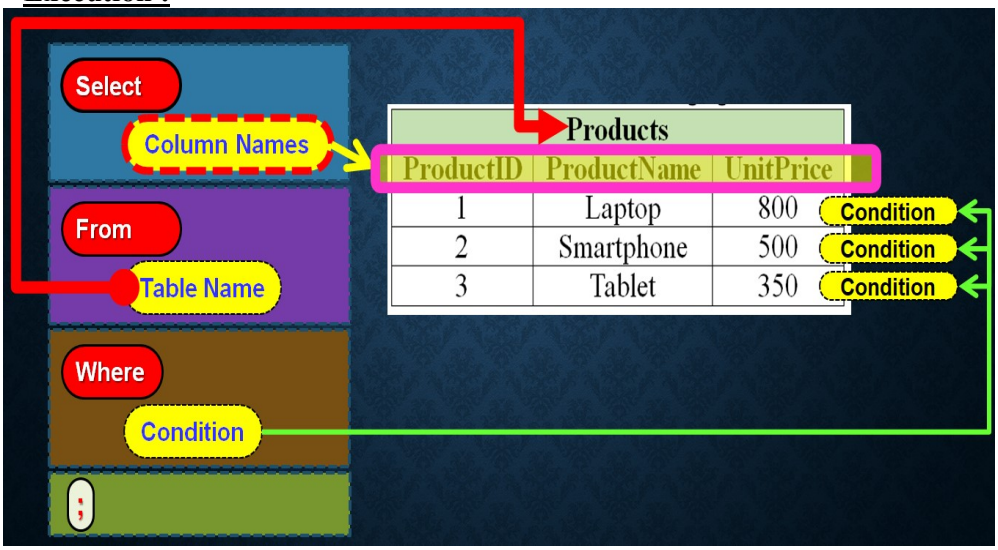
Candidate Key All the attributes combinations inside a relation that can serve as primary key.
Constraint Rule and conditions set for data being stored in a database.
DDL Data Definition Language. SQL part-language that facilitates defining creation/ modification etc. of database objects such as tables, indexes, sequences etc.
DML Data Manipulation Language. SQL part-language that facilitates manipulation (addition/ deletion/ modification) of data residing in database object.
Primary Key A set of one or more attributes that can uniquely identify tuples within the relation.
Relation A table having non-empty atomic values with unordered rows and columns is relation.
SQL Structured Query Language. A non-procedural UGL used for querying upon relational database.
Tuple A row in a relation is called tuple. View A virtual table that does not really exist in its own right but is instead derived from one or more underlying base tables in called a view

(i) **Data Query:** SELECT, FROM, WHERE with operators

Syntax :



Execution :



- Fundamental components of a query used to retrieve specific data from a database table.
- This clauses allow you to specify :
  - **What data** you want to retrieve (**SELECT**),
  - **Which table** it should come from (**FROM**),
  - **Which specific rows** should be included based on a condition (**WHERE**).

Description of each:

(i) **SELECT:**

- used to specify which **columns** or **expressions** you want to retrieve from a database table.
- It is followed by a comma-separated list of column names or expressions enclosed in parentheses.

(ii) **FROM:**

- Specifies the table or tables from which you want to retrieve data.
- It follows the SELECT clause in the SQL query.
- You can query data from one or more tables by listing them after the FROM keyword, separated by commas.

(iii) WHERE:

- Used to filter the rows that are returned from the database table based on a specified condition.
- It follows the FROM clause and is followed by a condition that determines which rows should be included in the result set.
- The condition can include

- Relational Operators (e.g., '=', '<', '>', '<=', '>=', '<>'),
- Logical Operators (e.g., AND, OR),
- Other functions or expressions.

Example:
```
SELECT
        column1, column2
FROM
        table_name
WHERE
        column1 <= 'value';
```

(a) **Relational Operator** :

Operator Symbol	Description
>	greater than
<	less than
>=	greater than equal to
<=	less than equal to
=	equal
! = or <>	not equal to

(b) **Range Operator Between.** : The BETWEEN operator in SQL is used to filter rows based on a specified range of values.

```
SELECT
        ProductName, Price
FROM
        Products
WHERE
        Price   BETWEEN    10      AND   50;
```

(c) **Logical Operator** : Logical operator is used to combine two or more logical expression,

(i) And – evaluated true if all the logical expression is true otherwise false. E.g.

```
SELECT
        *
FROM
        Customers
WHERE
        Country = 'USA'     AND     City = 'New York';
```

(ii) Or - evaluated true if any the logical expression is true otherwise false. e.g.

```
SELECT
        *
FROM
        Products
WHERE
        Category = 'Electronics'      OR      Price < 50;
```

(d) **Comparing NULL** :

is null, is not null NULL (Absence of value) value cannot be compared using Relational operator.

This statement is used to check whether column contains NULL or not. E.g.

```
SELECT
        *
FROM
        Customers
WHERE
        PhoneNumber IS NULL;
```

30 Objective Question (1 Mark)	
Q1.	A ____ is a property of the entire relation, which ensures through its value that each tuple is unique in a relation
Ans	Attributes
Q2.	A row also called a Record or _____ represents a single, data item in a table. a. Column b. Tuples c. Fields d. None of the above
Ans	Tuples
Q3.	The Primary key is selected from the set of _____
Ans	Candidate keys
Q4.	Which of the following is a group of one or more attributes that uniquely identifies a row? (a) Key (b) Determinant (c) Tuple(d) Relation
Ans	(a) Key
Q5.	Which of the following is a DDL command? (a) SELECT (b) ALTER (c) INSERT (d) UPDATE
Ans	(b) ALTER
Q6.	In SQL, which of the following will select only one copy of each set of duplicate rows from a table. (a) SELECT UNIQUE (b) SELECT DISTINCT (c) SELECT DIFFERENT (d) All of these
Ans	(b) SELECT DISTINCT
Q7.	We can change the structure of a table ie. add, remove or change its column(s) using the _____ statement.
Ans	Alter Table
Q8.	The keyword _____ is used to eliminate redundant data from display. a. Modify b. Distinct c. Describe d. None of the above
Ans	Distinct
Q9.	Give the example of wild card character _____ a. % b. _ c. Both a) and b) d. None of the above
Ans	Both a) and b)
Q10.	The results of the SELECT statement can be displayed in the ascending or descending order of a single column or columns using _____ clause. a. Non Order by b. Modular c. Order by d. Where cause
Ans	Order by
Q11	When the same piece of data is stored in two or more locations, it is called _____. a. Data Redundancy b. Data Integrity c. Data Consistency d. None of the above
Ans	a. Data Redundancy
Q12	The unique field present in the table is called _____. a. Primary Key b. Candidate Key c. Foreign Key d. None of the above
Ans	Primary Key
Q13	SQL stands for _____.
Ans	Structured Query Language

Q14	A _____ is a subset of DML that just deals with information retrieval. a. Query Language b. Structure Language c. Both a) and b) d. None of the above
Ans	Query Language
Q15	A _____ is a language that enables users to access and manipulate data in a database. a. Data Manipulation Language (DML) b. Data Definition Language (DDL) c. Both a) and b) d. None of the above
Ans	Data Manipulation Language (DML)
Q16.	What SQL clause is used to specify the columns you want to retrieve from a table? (A) SELECT (B) FROM (C) WHERE (D) INSERT
Ans	A) SELECT
Q17.	Which SQL clause specifies the table from which data should be retrieved? (A) SELECT (B) FROM (C) WHERE (D) UPDATE
Ans	B) FROM
Q18.	What SQL operator is used for exact value matching in a WHERE clause? (A) LIKE (B) BETWEEN (C) = (D) AND
Ans	C) =
Q19.	Which SQL operator is used to check if a column value falls within a specified range? (A) LIKE (B) BETWEEN (C) = (D) AND
Ans	B) BETWEEN
Q20.	What is the purpose of the IS NULL operator in SQL? (A) It checks if a column contains a specific value. (B) It checks if a column is empty. (C) It checks if a column is not empty. (D) It checks if a column exists.
Ans	B) It checks if a column is empty.
Q21.	Which logical operator combines multiple conditions in a WHERE clause with an OR relationship? (A) AND (B) OR (C) NOT (D) XOR
Ans	B) OR

Q22.	What SQL statement is used to add new records to a database table? (A) INSERT (B) DELETE (C) UPDATE (D) ALTER
Ans	A) INSERT
Q23.	Which SQL clause is used to delete records from a database table? (A) INSERT (B) DELETE (C) UPDATE (D) ALTER
Ans	B) DELETE
Q24.	Which SQL clause is used to modify existing records in a database table? (A) INSERT (B) DELETE (C) UPDATE (D) ALTER
Ans	C) UPDATE
Q25.	Which SQL statement is used to remove all records from a table? (A) TRUNCATE (B) DROP (C) DELETE (D) REMOVE
Ans	C) DELETE
Q26	What does the SQL WHERE clause do? (A) It specifies which columns to retrieve. (B) It filters the rows to include based on a condition. (C) It specifies the table to query. (D) It sorts the result set.
Ans	B) It filters the rows to include based on a condition.
Q27	What is the purpose of the NOT operator in a SQL WHERE clause? (A) It negates a condition. (B) It checks if a column is empty. (C) It checks if a column exists. (D) It combines conditions with OR.
Ans	A) It negates a condition.
Q28	Which SQL clause is used to update data in a table with new values? (A) INSERT (B) DELETE (C) UPDATE (D) ALTER
Ans	C) UPDATE
Q29	What SQL operator is used for pattern matching in a WHERE clause? (A) LIKE (B) BETWEEN (C) = (D) AND
Ans	A) LIKE
Q30	Which SQL operator checks if a column value is not equal to a specified value in a WHERE clause? (A) LIKE (B) BETWEEN (C) <> (D) AND
Ans	C) <>

10 Assertion and reason Based question (1 Mark)	
In the following questions, a statement of Assertion (A) is followed by statement of Reason . (R). Mark the correct choice as : (a) Both A and R are true and R is the correct explanation of A. (b) Both A and R are true and R is not the correct explanation of A. (c) A is true but R is false (or partly true) (d) A is false (or partly true) but R is true. (e) Both A and R are false or not fully true.	
Q1.	**Assertion :** A data table can have only one Primary key. **Reason :** In a data table, there can be only one attribute/field containing unique values for each row.
Ans	A is true but R is false (or partly true)
Q2.	**Assertion** : There can be multiple options for choosing a primary key in a data table. **Reason :** All attribute combinations inside a data table that contain unique values for each row, are the candidates keys.
Ans	Both A and R are true and R is not the correct explanation of A
Q3.	**Assertion :** All types of keys contain unique values A data table can have only one Primary key. **Reason :** In a data table, there can be only one attribute/field containing unique values for each row.
Ans	A is true but R is false (or partly true)
Q4.	**Assertion :** A data table can have only one Primary key. **Reason :** In a data table, there can be only one attribute/field containing unique values for each row.
Ans	Both A and R are true and R is not the correct explanation of A.
Q5.	**Assertion :** Foreign key is a non-key attribute whose value is derived from primary key of another table. **Reason :** Each foreign key refers a candidate key in a relation.
Ans	Both (A) and (R) are correct and (R) is not the correct explanation of (A).
Q6.	**Assertion:** The SQL SELECT statement is used to update records in a database. **Reason :** The SELECT statement allows you to retrieve data from a database table.
Ans	(C) The assertion is true, but the reason is false.
Q7.	**Assertion:** The SQL WHERE clause is used for sorting the result set of a query. **Reason :** The WHERE clause specifies conditions to filter rows in a query.
Ans	(C) The assertion is true, but the reason is false.
Q8.	**Assertion:** The IS NULL operator in SQL checks if a column has a value. **Reason :** The IS NULL operator checks if a column contains a specific value.
Ans	(C) The assertion is true, but the reason is false.
Q9.	**Assertion:** The SQL DELETE statement is used to add new records to a database table. **Reason :** The DELETE statement removes records from a database table.
Ans	(B) Both the assertion and reason are true, but the reason does not explain the assertion.

Q10. **Assertion:** The SQL BETWEEN operator is used for exact value matching in a WHERE clause.
Reason : The BETWEEN operator checks if a column value falls within a specified range.

Ans (A) Both the assertion and reason are true, and the reason correctly explains the assertion.

10 Short Knowledge/Understanding/Application Based Questions (2 Marks)

Q1. **Differentiate between DDL and DML with one Example each.**

Ans

DDL	**DML**
Stands for Data definition language	**Stands for** Data manipulation language
Consists of commands used to modify the metadata of a table.	Consist of commands used to modify the data of a table.
Example- create table, alter table, drop table	Example- insert, delete, update

Q2. Correct the error in the following query.
Select * from RECORD where Rname = %math%;

Ans Correct Query: Select * from RECORD where Rname**like** %math%;

Q3. Observe the following tables TRANSACTIONS and CUSTOMERS carefully and answer the questions that follows :

Table : Transaction

TNo	**Type**	**Amount**	**CNo**
T1	CREDIT	1000	C3
T2	DEBIT	1500	C1

Table : Customer

CNo	**CNAME**
C1	**ZEESHAN**
C2	**AMAN**
C3	**JASPREET**

(i) What is the degree of the table Transaction ? what is the cardinality of the table Customers ?

ii. Identify the primary key and candidate keys from the table Transcations.

Ans (i) Degree of the table TRANSACTIONS=4 Cardinality of table CUSTOMERS=3
(ii) TNO PRIMARY KEY; TNO, CNO CANDIDATES KEYS

Q4. Anjali writes the following commands with respect to a table employee having fields, empno, name, department, commission. Command1: Select count(*) from employee; Command2 :Select count(commission) from employee; She gets the output 4 for the first command but get an output 3 for the second command. Explain the output with justification.

Ans	The Count(*) function returns the total number of records in the table while count() will return the count of non-null values in the given field and this is the reason for the different results by the given queries above. The field commission must be containing a NULL value and thus count(commission) returned the count of non-null values and count(*) return total number of records (Irrespective of NULL values in the field).
Q5.	Identify the problem/issue with the following SQL query : SELECT house, count(*) FROM student;
Ans	The problem with the given SQL query is that there is no GROUP BY clause is given and thus, it will lead to an error. The reason being that the select list use COUNT() function, which is an aggregate function, along with a field. When we use an aggregate function in the select list along with a database field, we need to add a GROUP BY clause. To correct the error it should use GROUP BY clasue. SELECT house, count(*) FROM student GROUP BY house;
Q6.	Explain the purpose of the SQL SELECT statement and provide an example of how it is used to retrieve specific data from a database table.
Ans	The SQL SELECT statement is used to retrieve specific data from a database table. Example: SELECT FirstName, LastName FROM Employees;
Q7.	What is the difference between the SQL WHERE and HAVING clauses? Provide an example of when you would use each of them in a query.
Ans	The SQL WHERE clause is used to filter rows before the grouping (e.g., filtering rows before an aggregation), while the HAVING clause is used to filter rows after the grouping (e.g., filtering groups based on aggregate results). Example: Use WHERE to filter employees with a salary above 50,000; Use HAVING to filter departments with an average salary above 60,000.
Q8.	You have a database table named "Employees" with columns "EmployeeID," "FirstName," and "LastName." Write an SQL query to retrieve the first and last names of all employees whose first name is "John."
Ans	SELECT FirstName, LastName FROM Employees WHERE FirstName = 'John';
Q9.	Describe the primary function of the SQL INSERT statement and provide an example of how it is used to add new records to a database table.
Ans	The primary function of the SQL INSERT statement is to add new records to a database table. Example: INSERT INTO Employees (FirstName, LastName) VALUES ('Jane', 'Doe');
Q10.	You have a table named "Products" with columns "ProductID," "ProductName," and "Price." Write an SQL query to update the price of a product with a ProductID of 101 to $25.50.
Ans	UPDATE Products SET Price = 25.50 WHERE ProductID = 101;
10 Short Knowledge/Understanding/Application Based Questions (3 Marks)	
Q1.	Differentiate between Primary Key and Alternate Key.
Ans	**Primary keys** | **Alternate keys** Primary keys - Contain one or more columns whose combined values uniquely identify every row in a table. Each table can have only one primary key. | Alternate keys - Contain one or more columns whose combined values uniquely identify every row in a table.
Q2.	In a multiplex, movies are screened in different auditoriums. One movie can be shown in more than one auditorium. In order to maintain the record of movies, the multiplex maintains a relational database consisting of two relations viz. MOVIE and AUDI respectively as shown below:

	Movie(Movie_ID, MovieName, ReleaseDate) Audi(AudiNo, Movie_ID, Seats, ScreenType,TicketPrice) a) Is it correct to assign Movie_ID as the primary key in the MOVIE relation? If no, then suggest an appropriate primary key. b) Is it correct to assign AudiNo as the primary key in the AUDI relation? If no, then suggest appropriate primary key. c) Is there any foreign key in any of these relations?
Ans	a) Yes, because every movie will have it's unique id. b) Yes, because every auditorium will be assigned a unique id. No two auditoriums will have same id. c) Yes, Movie_ID in Audi table is the foreign because it references the Movie_ID in the Movie table.
Q3.	An organisation wants to create a database EMPDEPENDENT to maintain following details about its employees and their dependent. EMPLOYEE(AadharNumber, Name, Address,Department,EmployeeID) DEPENDENT(EmployeeID, DependentName, Relationship) a) Name the attributes of EMPLOYEE, which can be used as candidate keys. b) The company wants to retrieve details of dependent of a particular employee. Name the tables and the key which are required to retrieve this detail c) What is the degree of EMPLOYEE and DEPENDENT relation?
Ans	a) AadharNumber and EmployeeID can be used for candidate keys because they are unique to every employee. b) Employee and Dependent tables are required. EmployeeID is the key to retrieve the required data. c) Degree of Employee relation = 5 and degree of Dependent relation = 3 The number of attributes in a relation is called the Degree of the relation.
Q4.	Why foreign keys are allowed to have NULL values? Explain with an example.
Ans	In a relational database, a foreign key is a field that refers to the primary key in another table. The foreign key establishes a link or relationship between two tables. In some database systems, foreign keys are allowed to have NULL values, Allowing foreign keys to have NULL values can be useful in certain scenarios, such as when one have optional relationships between tables. In such cases, the absence of a foreign key value indicates that there is no corresponding entry in the referenced table.
Q5.	Compared to a file system, how does a database management system avoid redundancy in data through a database?
Ans	A database management system (DBMS) is designed to provide a structured and efficient way to store, retrieve, and manage data. Compared to a file system, a DBMS offers several features and mechanisms to avoid redundancy in data and promote data integrity. Here are some key ways in which a DBMS achieves this: Data Normalization: Reduction of Redundant Data: Foreign Keys: DBMSs use foreign keys to establish relationships between tables. Data Type Enforcement: DBMSs enforce consistent data types for columns, preventing the storage of incompatible data. Constraints: Integrity constraints, such as unique constraints and check constraints, ensure that data adheres to specified rules, preventing the insertion of duplicate or inconsistent information. ACID Properties: Atomicity, Consistency, Isolation, Durability (ACID): DBMSs adhere to these fundamental properties

Q6.	Explain the purpose of SQL transactions and why they are important in database management.
Ans	SQL transactions are used to ensure the atomicity, consistency, isolation, and durability (ACID) properties of a database. Transactions are important to maintain data integrity by allowing a series of SQL statements to be executed as a single, indivisible unit, ensuring that either all changes are applied or none.
Q7.	Describe the differences between the SQL INNER JOIN, LEFT JOIN, and RIGHT JOIN operations. Provide an example for each
Ans	**INNER JOIN**: Returns records that have matching values in both tables. Example: **SELECT * FROM Table1 INNER JOIN Table2 ON Table1.ID = Table2.ID;** **LEFT JOIN:** Returns all records from the left table (Table1), and the matched records from the right table (Table2). Unmatched records from Table2 will contain NULL values. Example: **SELECT * FROM Table1 LEFT JOIN Table2 ON Table1.ID = Table2.ID;** **RIGHT JOIN:** Returns all records from the right table (Table2), and the matched records from the left table (Table1). Unmatched records from Table1 will contain NULL values. Example: **SELECT * FROM Table1 RIGHT JOIN Table2 ON Table1.ID = Table2.ID;**
Q8.	You have a database table named "Orders" with columns "OrderID," "CustomerID," and "OrderDate." Write an SQL query to retrieve the number of orders placed by each customer.
Ans	SELECT CustomerID, COUNT(OrderID) AS OrderCount FROM Orders GROUP BY CustomerID;
Q9.	Describe the purpose of SQL indexes and their significance in database performance optimization.
Ans	SQL indexes are data structures that improve the speed of data retrieval by allowing the database management system to locate specific rows more quickly, similar to the index in a book. They enhance database performance by reducing the need for the database engine to scan the entire table when searching for specific data.
Q10.	You have a database table named "Students" with columns "StudentID," "FirstName," "LastName," and "Age." Write an SQL query to delete all students below the age of 18.
Ans	DELETE FROM Students WHERE Age < 18;
10 Short Knowledge/Understanding/Application Based Questions (4 Marks)	
Q1.	Consider the following table ACTIVITY and COACH and answer the following parts of this question :Table : ACTIVITY

Acode	ActivityName	Stadium	ParticipantsNum	PrizeMoney	ScheduleDate
1001	*Relay 100 x 4*	*Star Annex*	*16*	*10000*	*23-Jan-04*
1002	*High Jump*	*Star Annex*	*10*	*12000*	*12-Dec-03*
1003	*Shot Put*	*Super Power*	*12*	*8000*	*14-Feb-04*
1005	*Long Jump*	*Star Annex*	*12*	*9000*	*01-Jan-04*
1008	*Discuss Throw*	*Super Power*	*10*	*15000*	*19-Mar-04*

TABLE COACH

PCode	Name	ACode
1	Ahmad Hussain	1001
2	Ravinder	1008
3	Janila	1001

Give the output of the following SQL queries:

(i) SELECT COUNT(DISTINCT ParticipantsNum) FROM ACTIVITY;

(ii) SELECT MAX(ScheduleDate), MIN(ScheduleDate) FROM ACTIVITY;

(iii) SELECT Name,ActivityName FROM ACTIVITY A, COACH C WHERE A.Acde=C.Acode AND A.ParticipantsNum=10;

(iv) SELECT DISTINCT ParticipantsNum FROM ACTIVITY;

Ans

(i) COUNT(DISTINCT ParticipantsNum) ---------- 3

(ii) MAX(ScheduleDate) MIN(ScheduleDate) ---------- 19-Mar-04 12-Dec-03

(iii) Name ActivityName ---------- Ravubder Discuss Throw

(iv) DISTINCT ParticipantsNum ---------- 16 10 12

Q2. **Choose appropriate answer with respect to the following code snippet.**

CREATE TABLE student (name CHAR(30), student_id INT, gender CHAR(1), PRIMARY KEY (student_id));

a) What will be the degree of student table?

b) What does 'name' represent in the above code snippet?

c) What is true about the following SQL statement?

Select * FROM student;

i) Displays contents of table 'student'

ii) Displays column names and contents of table 'student'

iii) Results in error as improper case has been used

iv) Displays only the column names of table 'student'

d) In the following query how many rows will be deleted?

DELETE student

WHERE student_id=109;

Ans

a) 3, b) a column c) Displays column names and contents of table 'student'

e) All the rows where student ID is equal to 109

Q3.

TID	TName	TSal	TDept	TDesig
1	Amit	2000	IT	PGT
2	Sunit	1500	HISTORY	TGT
3	Naina	1800	MATH	PGT

Write the sql command for the following queries and answer the question

a. What is degree and Cardinality of the Table : Teacher

b. Identify the primary key in the table

c. Display the records of all PGT staff

d. Increase the salary of teachers of Math Department.

Ans

a. Degree 5, Cardinality 3

b. b.TID

c. Select * from Teacher Where TDesig =PGT;

d. Update Teacher set salary= salary + salay *20/100 Where TDept=Math

Q4. **Suppose your school management has decided to conduct cricket matches between students of class XI and Class XII. Students of each class are asked to join any one of the four teams — Team Titan, Team Rockers, Team Magnet and Team Hurricane. During summer vacations, various matches will be conducted between these teams. Help your sports teacher to do the following:**

a) Create a database "Sports".
b) Create a table "TEAM" with following considerations:
   i) It should have a column TeamID for storing an integer value between 1 to 9, which refers to unique identification of a team.
   ii) Each TeamID should have its associated name (TeamName), which should be a string of length not less than 10 characters
c. Using table level constraint, make TeamID as primary key
d. Show the structure of the table TEAM using SQL command.

Ans

a.Create database Sports;
use Sports
b. create table team (teamidint(1), teamname varchar(10));
c. alter table team add primary key (teamid);
d. desc team;

Q5. Consider the following table STOCK and DEALERS and answer the following parts of this question :

Table :STOCK

Item No	Item	Dcode	Qty	UnitPrice	StockDate
5005	Ball Pen 0.5	102	100	16	31-Mar-10
5003	Bal Pen 0.25	102	150	20	01-Jan-10
5002	Gel Pen Premium	101	125	14	14-Feb-10
5006	Gel Pen Classis	101	200	22	01-Jan-09
5001	Eraser Small	102	210	5	19-Mar-09
5004	Eraser Big	102	60	10	12-Dec-09
5009	Sharpener Classis	103	160	8	23-Jan-09

Table :DEALERS

Dcode	Dname
101	Reliable Stationers
103	Classis Plastics
102	Clear Deals

Give the output of the following SQL queries:

(i) SELECT COUNT(DISTINCT Dcode)
FROM STOCK;

(ii) SELECT QTY*UnitPrice FROM STOCK WHERE ItemNo=5006;

(iii) SELECT Item, Dname FROM STOCK S DEALERS D WHERE S.Dcode=D.Dcode AND ItemNo=5004;

(iv) (iv) SELECT MIN(StockDate) FROM STOCK;

Ans

(i) COUNT(DISTINCT Dcode) ---------- 3
(ii) QTY*UnitPrice ---------- 4400
(iii) Item Dname
(iv) MIN(StockDate) --- ---------- Eraser Big Clear Deals 01-Jan-09

Q6. Describe the differences between a primary key and a foreign key in a database table. Provide an example of how they are used in a real-world scenario.

Ans A primary key is a unique identifier for a record in a table, ensuring that each row has a distinct value. A foreign key is a field in one table that refers to the primary key in another table, establishing a relationship between the two. For example, in a database for an e-commerce site, the "CustomerID" in the "Orders" table is a foreign key that links to the "CustomerID" in the "Customers" table.

Q7. You have two database tables: "Customers" and "Orders." Write an SQL query to retrieve the names of customers who have placed more than five orders.

Ans
```
SELECT
        Customers.CustomerName
FROM
        Customers  JOIN Orders ON Customers.CustomerID = Orders.CustomerID
GROUP BY
        Customers.CustomerName
HAVING
        COUNT(Orders.OrderID) > 5;
```

Q8. You are tasked with designing a database TABLES for a library. Describe the necessary tables, including primary keys and foreign keys, to store information about books, authors, borrowers, and book loans.

Ans (i) Table "Books": BookID (PK), Title, ISBN, AuthorID (FK).
(ii) Table "Authors": AuthorID (PK), FirstName, LastName.
(iii) Table "Borrowers": BorrowerID (PK), FirstName, LastName, ContactInfo.
(iv) Table "BookLoans": LoanID (PK), BookID (FK), BorrowerID (FK), LoanDate, ReturnDate

Q9. Consider the following tables customer and orders:

Customers

CustomerID	CustomerName	ContactName	Country
1	Customer A	John Doe	USA
2	Customer B	Jane Smith	Canada
3	Customer C	David Johnson	UK
4	Customer D	Emily Brown	Australia
5	Customer E	Michael Lee	Germany

Orders

OrderID	CustomerID	OrderDate	TotalAmount
101	1	2023-01-15	500.00
102	2	2023-02-20	750.00
103	1	2023-03-10	300.00
104	3	2023-04-05	900.00
105	4	2023-05-15	600.00

(A) Write an SQL query to retrieve the names of customers (CustomerName) who have placed orders.
(B) Write an SQL query to calculate the total amount of orders placed by each customer. Display the customer's name (CustomerName) and the total order amount.
(C) Write an SQL query to find the customer (CustomerName) who placed the highest total order amount and the corresponding total amount.
(D) Write an SQL query to retrieve the CustomerName and OrderDate for orders placed in the year 2023.

Ans
(A)
```
SELECT DISTINCT c.CustomerName
FROM Customers c
INNER JOIN Orders o ON c.CustomerID = o.CustomerID;
```
(B)
```
SELECT c.CustomerName, SUM(o.TotalAmount) AS TotalOrderAmount
FROM Customers c
INNER JOIN Orders o ON c.CustomerID = o.CustomerID
GROUP BY c.CustomerName;
```

(C)
```
SELECT TOP 1  c.CustomerName, SUM(o.TotalAmount) AS TotalOrderAmount
FROM Customers c
INNER JOIN Orders o ON c.CustomerID = o.CustomerID
GROUP BY c.CustomerName
ORDER BY TotalOrderAmount DESC;
```

(D)
```
SELECT c.CustomerName, o.OrderDate
FROM Customers c
INNER JOIN Orders o ON c.CustomerID = o.CustomerID
WHERE YEAR(o.OrderDate) = 2023;
```

Q10. Consider the following tables:

Employees

EmployeeID	FirstName	LastName
1	John	Doe
2	Jane	Smith
3	Michael	Johnson
4	Sarah	Davis
5	Kevin	Lee

Salaries

EmployeeID	Salary
1	60000
2	55000
3	62000
4	58000
5	63000

(a) Write an SQL query to retrieve the first names, last names, and salaries of employees.
(b) Write an SQL query to calculate the average salary of employees.
(c)Write an SQL query to find the first names of employees whose salary is higher than the average salary.
(d) Write an SQL query to increase the salary of employees by 10% if their salary is less than 60000.

Ans (a)
```
SELECT
        E.FirstName, E.LastName, S.Salary
FROM
        Employees E
JOIN Salaries S ON E.EmployeeID = S.EmployeeID;
```

(b)
```
SELECT
        AVG(Salary) AS AverageSalary
FROM
        Salaries;
```

(c)
```
SELECT
        FirstName
FROM
        Employees
WHERE
        Salary > (SELECT AVG(Salary) FROM Salaries);
```

(d)
```
UPDATE
        Salaries
SET
        Salary = Salary * 1.10
WHERE
        Salary < 60000;
```

07 Case Based Questions (5 Marks)

Q1. A library uses database management system(DBMS) to store the details of the books that it stocks, its registered members and the book-loan that the library has made. These details are stored in a database using the following three relations. Name of the Database : KV Library

• **Book** (BookID : Char(5), Title : Varchar(25), Author :Varchar(25), Publisher : Varchar(100))

	•**Member**(MemberID:Char(5), LastName:Varchar(25), FirstName:Varchar(25), Correspondence-Address : Varchar(100), Pincode : Char(6), DateofBirth : Date, EmailID : Varchar(50)) •**Loan**(MemberID: Char(5), BookID:Char(5), LastDate:Date, DueBackDate:Date, Returned :Boolean) **Note : The Library does not stock more than one copy of the same book** (a) Identify following types of keys from all the relations of the given database Foreign keys along with parent relations. 2 (b) Can a relation have multiple foreign keys? Give example. 1 (c) Can a foreign key be part of a primary key? Give example 1 (d) Write a SQL query to retrieve the names and email addresses of the 1members belonging to KVS (they have email ids as _____@kvs.in) and have not returned their books
Ans	(a) (iii) Loan Table (b) I. (i) Book : Title (ii) Member: EmailID II. No, the Loan relation cannot have alternate key as its primary key is a composite key having foreign key. (c) INSERT INTO Loan Values('M1255', 'B3100', '02/02/2020', '09/02/2020', False) (d) Select FirstName, LastName, EmailID From Member, Loan Where Member.MemberID=Loan.MemberID AND Returned = 'False';
Q2.	Rachana Mittal runs a beauty parlor. She uses a database management system(DBMS) to store the information that she needs to manage her business. This information includes customer contact details, staff names, the treatments that the parlor offer (for example, ''Hair Massage') and appointment that customers have made for treatments. A separate appointment must be made for each treatment. The details are stored in a database using the following four relations: **Customer**: (CustomerID, FirstName, LastName, TelephoneNumber, EmailAddress) **Staff**: (StaffID, FirstName,LastName, IsQualified) Treatment: (TreatmentName,Price,TimeTaken,NeedsQualification) Appointment : (CustomerID,TreatmentName,ApDate,ApTime) • The **IsQualified** attribute for a member of staff stores one of the value True or False, to indicate if the member of staff is fully qualified or not. •The **NeedsQualifiction** attribute for a treatment stores True or False to indicate if the treatment can only be given by a qualified member of staff. •The **TimeTaken** attribute for a treatment is the number of minutes (a whole number) that the treatment takes. (a) Write a SQL statement to create the table staff. (b) Write a query to Insert a record in the table Staff with following data ; (2009, 'Sheril', 'Mark', 'True') (c) Which table's records can be deleted without affecting any other table? (i) Customer (ii) Staff (iii) Treatment (iv) Appointment (d) Write a query to Modify table Appointment to add a new column StaffID, which should hold a legal StaffID value from the staff table. (e) Rachana wants to send e-mail advertisement to all the customers who had a 'RF Facial' treatment in 2020. To send the email, the customer's email address, firstname and lastname are needed. Write a SQL query to retrieve the email address, firstname and lastname of each customer to whom email should be sent.

Ans

(a) Create Table Staff (StaffID Number(4,0) NOT NULL PRIMARY KEY, FirstName Varchar(20) NOT NULL, LastNameVarchar(20), ISQualifiedChar(4) Check (IsQualified IN('True', 'False')));
(b) INSERT INTO Staff Values(2009, 'Sheril', 'Mark', 'True');
(c) (ii) Staff table's records can be deleted without affecting any other table as of now, because this table is not linked with any other table yet.
(d) Alter Table Appointment Add StaffIDNumber(4,0) NOT NULL Reference Staff(StaffID);
(e) Select EmailAddress, FirstName,LastName From Customer C, Appointment A Where C.CustomerID=A.CustomerID AND TreatmentName= 'RF Facial';

Q3.

Online Store: You are managing an online store database with two tables: "Products" and "Orders."

Products		
ProductID	**ProductName**	**UnitPrice**
1	Laptop	800
2	Smartphone	500
3	Tablet	350

Orders		
OrderID	**ProductID**	**Quantity**
101	1	2
102	2	3
103	1	1

Question: Write SQL queries to perform the following tasks:
(a) Retrieve the total sales revenue for each product (sales = quantity * unit price).
(b) Find the product total sales revenue in highest to lowest order.
(c) Retrieve the product names that have not been ordered.
(d) Increase the unit price of all products by 10%. e. Delete the order with OrderID 102.

Ans

(a)
```
SELECT P.ProductName, SUM(O.Quantity * P.UnitPrice) AS TotalRevenue
FROM Products P
LEFT JOIN Orders O ON P.ProductID = O.ProductID
GROUP BY P.ProductName;
```
(b)
```
SELECT      P.ProductName
FROM        Products P
LEFT JOIN Orders O ON P.ProductID = O.ProductID
GROUP BY   P.ProductName
ORDER BY   SUM(O.Quantity * P.UnitPrice) DESC;
```
(c)
```
SELECT P.ProductName
FROM Products P
LEFT JOIN Orders O ON P.ProductID = O.ProductID
WHERE O.OrderID IS NULL;
```
(d)
```
UPDATE Products
SET UnitPrice = UnitPrice * 1.10;
```
(e)
```
DELETE FROM Orders WHERE OrderID = 102;
```

Q4.

Employee Performance
You are managing an employee performance database with a "Performance" table.

Performance		
EmployeeID	**Month**	**Rating**
1	Jan	4
2	Jan	5
1	Feb	5
2	Feb	4

Question: Write SQL queries to perform the following tasks:
(a) Calculate the average rating for each employee for the months of January and February.
(b) Find the employee rating in ascending order.
(c) Identify employees who received a rating of 4 or higher in both January and February.
(d) Increase the rating of all employees by 1 for the month of March.
(e) Delete all records for employees with an average rating below 4.

Ans

(a)
```
SELECT      EmployeeID, AVG(Rating) AS AverageRating
FROM        Performance
WHERE       Month IN ('Jan', 'Feb')
GROUP BY    EmployeeID;
```

(b)
```
SELECT      EmployeeID
FROM        Performance
ORDER BY    RATING
```

(c)
```
SELECT      EmployeeID
FROM        Performance
WHERE       Month IN ('Jan', 'Feb')
GROUP BY    EmployeeID
HAVING      MIN(Rating) >= 4;
```

(d)
```
UPDATE      Performance
SET         Rating = Rating + 1
WHERE       Month = 'Mar';
```

(e)
```
DELETE FROM  Performance
WHERE        EmployeeID IN (  SELECT      EmployeeID
                              FROM        Performance
                              WHERE       Month IN ('Jan', 'Feb')
                              GROUP BY    EmployeeID
                              HAVING      AVG(Rating) < 4
                           );
```

Q5.

Student Enrollment
You are managing a student enrollment database with two tables: "Students" and "Courses."

Students		
StudentID	**FirstName**	**LastName**
1	Alice	Smith
2	Bob	Johnson
3	Carol	Davis

Courses	
CourseID	**CourseName**
101	Math
102	History
103	Science

Question: Write SQL queries to perform the following tasks:
(a) Retrieve the total number of students enrolled in each course.
(b) Insert a new the student with following details (Id= 1, Name = Don Bradman)
(c) Retrieve the courses that have not been enrolled in.
(d) Update the last name of student with StudentID 1 to "Brown."
(e) Delete the enrollment record for StudentID 3 in CourseID 103.

Ans

(a)
```
SELECT C.CourseName, COUNT(E.StudentID) AS Enrollments
FROM Courses C
LEFT JOIN StudentsEnrollments E ON C.CourseID = E.CourseID
GROUP BY C.CourseName;
```

(b)
```
INSERT INTO students
VALUES (1, “Don”,  “Bradman”)
```

(c)
```
SELECT  C.CourseName
FROM     Courses C  LEFT JOIN StudentsEnrollments E ON C.CourseID =
E.CourseID
WHERE   E.StudentID IS NULL;
```

(d)
```
UPDATE       Students
SET             LastName = 'Brown'
WHERE        StudentID = 1;
```

(e)
```
DELETE       FROM          StudentsEnrollments
WHERE        StudentID = 3   AND   CourseID = 103;
```

Q6.

Employee Records

You are managing an employee records database with a single table: "Employees."

Employees				
EmployeeID	**FirstName**	**LastName**	**Department**	**Salary**
1	John	Doe	Sales	50000
2	Jane	Smith	Marketing	55000
3	Michael	Johnson	IT	60000
4	Sarah	Davis	Sales	52000
5	Kevin	Lee	IT	62000

Question: Write SQL queries to perform the following tasks:

(a) Retrieve the average salary for each department.

(b) Find the department with the highest salary.

(c) Insert a new row in table with suitable data.

(d) Update the salary of John Doe (EmployeeID 1) to 52000.

(e) Delete the employee with the lowest salary.

Ans

(a)
```
SELECT       Department, AVG(Salary) AS AvgSalary
FROM         Employees
GROUP BY    Department;
```

(b)
```
SELECT    Department,  MAX (Salary)
FROM      Employees
```

(c)
```
INSERT INTO  Employees
VALUES       (6, “Brain”, “Lara”, “IT”, 92000);
```

(d)
```
UPDATE   Employees
SET         Salary = 52000
WHERE    EmployeeID = 1;
```

(e)
```
DELETE FROM   Employees
WHERE            Salary = ( SELECT MIN  (Salary) FROM Employees );
```

Q7. **Online Bookstore :** You are managing an online bookstore database with two tables: "Books" and "Authors."

Books

okID	Title	AuthorID	Price
1	To Kill a Mockingbird	1	15.99
2	1984	2	12.49
3	The Great Gatsby	3	10.99

Authors

AuthorID	AuthorName
1	Harper Lee
2	George Orwel
3	F. Scott Fitzgera

Question: Write SQL queries to perform the following tasks:
(a) Retrieve the titles and prices of all books.
(b) Retrieve the names of authors who have books priced at or above 15.00.
(c) Update the price of "1984" (BookID 2) to 13.99.
(d) Delete the book with BookID 3 from the database.
(e) Add a new book titled "Pride and Prejudice" by "Jane Austen" with a price of 14.50.

Ans

(a)
```
SELECT   Title, Price
FROM     Books;
```

(b)
```
SELECT          A.AuthorName
FROM            Authors A
INNER JOIN      Books B ON A.AuthorID = B.AuthorID
WHERE           B.Price >= 15.00;
```

(c)
```
UPDATE      Books
SET         Price = 13.99
WHERE       BookID = 2;
```

(d)
```
DELETE FROM  Books
WHERE        BookID = 3;
```

(e)
```
INSERT INTO    Books   (Title,                  AuthorID,   Price)
VALUES                 ('Pride and Prejudice',  4,          14.50);
```

Name of the chapter : **Introduction to Emerging Trends**

Topics Covered

- Artificial Intelligence, Machine Learning, Natural Language Processing, Immersive experience(AR,VR),Robotics,Big data and its characteristics
- Internet of Things(IoT),Sensors,Smartcities,Cloud Computing and Cloud Services(SaaS, IaaS,PaaS);Grid Computing,Block chain technology.

Key Points

Artificial Intelligence (AI)

Artificial intelligence, or I, refers to devices or programmes that resemble human intelligence in order to carry out tasks and have the ability to iteratively improve themselves based on the data they gather

Machine Learning

Machine learning is a branch of artificial intelligence that enables computers to learn from data using statistical methods without explicit human programming. It includes algorithms that use information to learn on their own and anticipate the future.

Natural Language Processing (NLP)

Natural Language Processing (NLP) It deals with how people and computers communicate using human spoken languages like Hindi, English, etc. In fact, using our voice to conduct a web search, use a device, or control another device is achievable.

Virtual Reality – Virtual Reality (VR) is a three-dimensional, computer-generated situation that simulates the real world. The user can interact with and explore that environment by getting search immersed in it while interacting with the objects and other actions of the user.

Augmented Reality – The term "augmented reality" refers to the superimposition of computer-generated perceptual information over the actual physical surroundings (AR). Consider Pokémon Go as an illustration, where players look for animated characters that appear in their real-world surroundings on their phone or tablet.

Internet of Things (IoT)

The "Internet of Things" is a collection of interconnected devices that can connect to one another and exchange data in the same network or you can say, It is a overall network of interconnected devices as well as the technology that enables communication between them.

Sensors

Sensors are frequently used as monitoring and observing components. The development of IoT is being greatly aided by the evolution of smart electronic sensors. It will result in the development of fresh, intelligent systems with sensors.

smart city use the information and communication technologies (ICT), for creating, implementing, and promoting sustainable development methods to handle the issues of expanding urbanization

Cloud Computing

Cloud computing is a new trend where computer-based services are supplied via the Internet or the cloud and are accessible to the user from any location using any device. C

Grid Computing

Grid computing refers to a network of computers from various administrative domains cooperating to complete a task. Grid computing enables simple completion of complicated tasks that may be intractable for a single computer machine.

Artificial Intelligence, Machine Learning, Natural Language Processing, Immersive experience (AR, VR), Robotics, Big data and its characteristics, Internet of Things (IoT), Sensors, Smart cities, Cloud Computing and Cloud Services (SaaS, IaaS, PaaS); Grid Computing, Block chain technology.

15 Objective Question (1 Mark)	
Q1.	**Which of the following is a characteristic of Cloud Computing?** A. Requires physical installation of software B. On-demand self-service C. Limited scalability D. No remote access
Ans	B. On-demand self-service
Q2.	**What is grid computing primarily designed to do?** A. Process data sequentially B. Connect individual computers into a single supercomputer C. Manage local area networks D. Improve internet speed
Ans	**B. Connect individual computers into a single supercomputer**
Q3.	**What is a block in a blockchain?** A. A unit of digital currency B. A collection of transactions C. A type of encryption key D. A computer algorithm
Ans	**B. A collection of transactions**
Q4.	**What is Natural Language Processing (NLP)?** A. A programming language used for web development B. A branch of artificial intelligence focused on the interaction between computers and human language C. A specialized type of computer hardware for linguistic tasks D. A type of human language translation service
Ans	**B. A branch of artificial intelligence focused on the interaction between computers and human language.**
Q5.	**Which cloud computing term refers to the practice of using a network of remote servers hosted on the internet to store, manage, and process data, rather than a local server or a personal computer?** A. Cloud Storage B. Cloud Computing C. Cloud Hosting D. Cloud Data
Ans	**B. Cloud Computing**
Q6.	**What is the main goal of machine learning?** A. To enable computers to make decisions without human intervention B. To replace human intelligence with artificial intelligence C. To eliminate the need for data in computer systems D. To make computers faster and more powerful
Ans	**A. To enable computers to make decisions without human intervention**

Q7.	**What does "decentralized" mean in the context of blockchain?** A. The technology is managed by a central authority B. The ledger is distributed across multiple computers or nodes C. It is only accessible by a single user D. It is controlled by a single company
Ans	**B. The ledger is distributed across multiple computers or nodes**
Q8.	**What is the primary difference between Augmented Reality and Virtual Reality?** A. Augmented Reality adds digital elements to the real world, while Virtual Reality creates a fully simulated environment. B. Augmented Reality is only used in the gaming industry, while Virtual Reality has broader applications. C. Augmented Reality requires specialized headsets, while Virtual Reality can be experienced on any device. D. Augmented Reality is completely independent of the real world, while Virtual Reality interacts with physical surroundings.
Ans	**A. Augmented Reality adds digital elements to the real world, while Virtual Reality creates a fully simulated environment.**
Q9.	**What is Artificial Intelligence (AI)?** A. A type of computer program B. The ability of machines to perform tasks that typically require human intelligence C. A branch of computer hardware engineering D. A form of virtual reality technology
Ans	**B. The ability of machines to perform tasks that typically require human intelligence**
Q10.	**Which of the following best defines the Internet of Things (IoT)?** A. A network of physical devices connected to the internet, capable of collecting and exchanging data. B. A virtual reality system for gaming and simulations. C. A system of interconnected computer servers used for data storage. D. A type of advanced computer programming language.
Ans	**A. A network of physical devices connected to the internet, capable of collecting and exchanging data.**
Q11	**What is one potential benefit of widespread IoT implementation?** • A. Reduced need for cybersecurity measures • B. Increased energy efficiency and resource conservation • C. Decreased reliance on cloud computing • D. Limited accessibility to data and information
Ans	**B. Increased energy efficiency and resource conservation**
Q12	**Which of the following is a characteristic of AI?** A. It only works in controlled laboratory environments B. It can learn and adapt from experience C. It is limited to a specific set of pre-programmed tasks D. It is exclusively used for playing video games
Ans	**B. It can learn and adapt from experience**
Q13	**Which cloud service model provides applications over the internet on a subscription basis?** A. Infrastructure as a Service (IaaS) B. Platform as a Service (PaaS) C. Software as a Service (SaaS) D. Function as a Service (FaaS)
Ans	**C. Software as a Service (SaaS)**

Q14	**What is the primary goal of robotics?** A. To create artificial intelligence capable of human-level cognition B. To build machines that can perform tasks or functions autonomously C. To develop virtual reality environments for simulation purposes D. To study the history of mechanical engineering
Ans	**B. To build machines that can perform tasks or functions autonomously**
Q15	**What does "algorithm" refer to in the context of AI?** A. A specific type of computer hardware used in AI B. A sequence of steps or rules followed by a computer to perform a task C. A type of virtual reality headset used in AI simulations D. A visual representation of data in AI systems
Ans	**B. A sequence of steps or rules followed by a computer to perform a task**
05 Assertion and reason Based question (1 Mark)	
(a) Both A and R are true and R is the correct explanation for A (b) Both A and R are true and R is not the correct explanation for A (c) A is True but R is False (d) A is false but R is True	
Q1.	**Assertion:** Cloud computing reduces the need for physical infrastructure and on-premises hardware. **Reasoning:** In cloud computing, resources are hosted and managed by cloud service providers, eliminating the need for organizations to maintain their own physical servers and hardware.
Ans	(a) Both A and R are true and R is the correct explanation for A
Q2.	**Assertion:** IoT devices are interconnected physical objects capable of collecting and exchanging data over a network. **Reasoning:** IoT enables devices to communicate and share information, leading to increased automation and efficiency in various domains.
Ans	(a) Both A and R are true and R is the correct explanation for A .
Q3.	**Assertion:** Natural Language Processing (NLP) is an application of Artificial Intelligence. **Reasoning:** NLP involves enabling computers to understand, interpret, and generate human language.
Ans	(a) Both A and R are true and R is the correct explanation for A This statement is true. NLP is a field within AI that focuses on enabling computers to process and understand human language, including tasks like language translation, sentiment analysis, and chatbots.
Q4.	**Assertion:** Public blockchains allow anyone to participate in the network and validate transactions. **Reasoning:** In public blockchains, nodes compete to validate transactions through a process called mining.
Ans	(a) Both A and R are true and R is the correct explanation for A This statement is true. Public blockchains are open and permission less, allowing anyone to join the network, validate transactions, and participate in consensus mechanisms like Proof of Work (mining) to secure the network.

Q5.	**Assertion:** Software as a Service (SaaS) delivers electricity over the internet on a subscription basis. **Reasoning:** SaaS applications are hosted and maintained by a service provider, eliminating the need for users to install or manage the software locally.
Ans	(d) A is false but R is True
05 Short Knowledge/Understanding/Application Based Questions (2 Marks)	
Q1.	**What is the significance of Machine Learning in Artificial Intelligence?**
Ans	Machine Learning is a subset of Artificial Intelligence that focuses on enabling machines to learn from data and improve their performance on specific tasks without being explicitly programmed. It allows AI systems to recognize patterns, make predictions, and learn from experience. Machine Learning is crucial in building AI models that can adapt to new information and perform tasks more accurately as they are exposed to more data. These questions aim to assess your understanding of fundamental concepts in Artificial Intelligence, including its goals, types of AI, and the role of Machine Learning.
Q2.	**What is Machine Learning?**
Ans	Machine Learning is a subset of AI that involves the development of algorithms that enable computers to learn from data and improve their performance on specific tasks without being explicitly programmed.
Q3.	**Define Robotics and provide an example of a real-world application where robotics is commonly used.**
Ans	• **Definition:** Robotics refers to the interdisciplinary field of engineering and computer science that focuses on the design, construction, operation, and use of robots. • **Example Application:** Manufacturing Industry - Robots are commonly used in manufacturing processes for tasks like welding, assembly, painting, and packaging.
Q4.	**What are some common applications of Augmented Reality (AR)?**
Ans	• **Gaming:** AR games, like Pokémon Go, use the real world as a backdrop and superimpose virtual elements for an interactive experience. • **Navigation and Wayfinding:** AR can provide visual directions and information about the user's surroundings in real time, helping with navigation. • **Education and Training:** AR can enhance learning by providing interactive and immersive educational experiences. • **Retail and E-commerce:** AR allows customers to virtually try on clothing, visualize furniture in their homes, or see products in 3D before making a purchase. • **Industrial and Maintenance:** AR can provide real-time guidance for technicians during complex tasks, overlaying information on machinery or equipment.
Q5.	**How does Grid Computing differ from other computing paradigms like Cluster Computing or Cloud Computing?**
Ans	**Cloud Computing:** Cloud computing involves accessing computing resources (like servers, storage, databases, networking, etc.) over the internet through a service provider's infrastructure. It is highly scalable and provides on-demand access to resources, while grid computing often involves a network of resources contributed by multiple organizations or entities.

05 Short Knowledge/Understanding/Application Based Questions (3 Marks)	
Q1.	**What are the three primary service models in cloud computing? Provide examples for each.**
Ans	1. **Infrastructure as a Service (IaaS):** • **Definition:** IaaS provides virtualized computing resources over the internet. Users can rent virtual machines, storage, and networking resources on a pay-as-you-go basis. • **Example:** Amazon Web Services (AWS) Elastic Compute Cloud (EC2) provides virtual servers (instances) that users can rent to run applications or host websites. Users have control over the operating system, software, and network configuration. 2. **Platform as a Service (PaaS):** • **Definition:** PaaS offers a platform that allows developers to build, deploy, and manage applications without having to worry about the underlying infrastructure. It provides a framework and environment for application development. • **Example:** Google App Engine allows developers to build, deploy, and scale applications without managing the underlying infrastructure. It supports various programming languages like Python, Java, and Go. 3. **Software as a Service (SaaS):** • **Definition:** SaaS delivers software applications over the internet on a subscription basis. Users can access these applications through a web browser, without needing to install or maintain them on their local devices. • **Example:** Salesforce is a customer relationship management (CRM) platform delivered as a SaaS. Users can access Salesforce through a web browser to manage customer relationships, sales pipelines, and more.
Q2.	**Provide three real-world applications where AI is currently being utilized and briefly describe how it benefits those applications.**
Ans	Any three valid examples.
Q3.	**What is Augmented Reality (AR) and how does it differ from Virtual Reality (VR)?**
Ans	• **Augmented Reality (AR):** AR is a technology that overlays digital information, such as images, sounds, or text, onto the real world. This can be done through devices like smartphones, tablets, or AR headsets. AR enhances the user's perception of the real world by adding virtual elements. • **Virtual Reality (VR):** VR immerses users in a completely virtual environment. It typically involves the use of a VR headset that completely covers the user's field of vision, replacing the real world with a computer-generated environment. VR aims to create a sense of presence, making the user feel like they are physically present in a different world.
Q4.	**What is Cloud Computing and how does it differ from traditional computing?**
Ans	**Cloud Computing:** Cloud computing refers to the delivery of computing services (such as storage, processing, networking, databases, etc.) over the internet. It allows users to access and use resources hosted on remote servers, which are maintained and managed by a cloud service provider. **Difference from Traditional Computing:** In traditional computing, applications and data are stored and processed on local computers or on-premises servers. In contrast, cloud computing offloads these tasks to remote servers, providing scalability, accessibility, and cost-efficiency benefits.

Q5.	**What is the purpose of Natural Language Processing (NLP) in AI?**
Ans	Natural Language Processing (NLP) is a branch of AI that focuses on enabling computers to understand, interpret, and generate human language. It allows machines to interact with and process text or speech data, enabling tasks like language translation, sentiment analysis, and chatbot interactions.**02 Marks** Valid e.g**1 mark**
05 Short Knowledge/Understanding/Application Based Questions (4 Marks)	
Q1.	**Define Blockchain and explain its key characteristics.**
Ans	Blockchain is a decentralized and distributed digital ledger technology that records transactions across multiple computers in a way that ensures security, transparency, and immutability. **Key Characteristics:** 1. **Decentralization:** No single entity or authority has control over the entire blockchain network. 2. **Distributed Ledger:** The ledger is maintained by a network of nodes, and every participant has a copy of the entire ledger. 3. **Immutability:** Once a transaction is added to the blockchain, it cannot be altered or deleted. 4. **Transparency:** All transactions are visible to all participants in the network. 5. **Security:** Blockchain uses cryptographic techniques to secure transactions and prevent unauthorized alterations.
Q2.	**Discuss one potential challenge or limitation in the field of AI and propose a possible solution to address it.**
Ans	One potential challenge in the field of AI is the issue of bias and fairness. When these biases are not addressed, AI models can perpetuate and even amplify existing social, cultural, or economic inequalities. This can result in discriminatory outcomes, particularly in sensitive areas like hiring, lending, or criminal justice. **Proposed Solution:** 1. **Diverse and Representative Training Data:** 2. **Bias Detection and Mitigation:** 3. **Transparent and Explainable Models:** 4. **Diverse Development Teams:** 5. **Ongoing Monitoring and Evaluation:** 6. **User Feedback and Accountability:** 7. **Regulations and Standards:**
Q3.	**What are the key advantages of Grid Computing?**
Ans	1. **Resource Sharing:** Grid computing allows organizations to share resources across different locations, optimizing resource utilization and reducing the need for excess capacity. 2. **Cost Efficiency:** By pooling resources, organizations can save costs associated with maintaining dedicated infrastructures for specific tasks. 3. **High Performance and Scalability:** Grids can provide significant computational power by harnessing the combined capabilities of multiple machines, making it suitable for large-scale, computationally intensive tasks. 4. **Flexibility and Load Balancing:** Grid systems can dynamically allocate resources based on demand, ensuring optimal performance and balancing workloads. 5. **Fault Tolerance:** Grids often incorporate redundancy and failover mechanisms to ensure continued operation even in the event of hardware failures.

Q4.	**What are the key characteristics of cloud computing?**
Ans	1. **On-Demand Self-Service**: Users can provision and manage computing resources as needed, without requiring human intervention from the service provider. 2. **Broad Network Access**: Cloud services can be accessed over the internet via various devices like laptops, smartphones, tablets, etc. 3. **Resource Pooling**: Cloud providers use multi-tenant models, where resources are pooled together and shared among multiple users, ensuring efficient resource utilization. 4. **Rapid Elasticity**: Cloud resources can be rapidly scaled up or down based on demand. This allows for flexibility in resource allocation. 5. **Measured Service**: Cloud resources usage can be metered, monitored, and billed based on actual usage. This provides transparency and cost control for users.
Q5.	**What is a blockchain and how does it ensure security and transparency in transactions? Provide an example scenario.**
Ans	**Blockchain Definition:** **Security and Transparency:** 1. **Cryptography:** Transactions are secured using cryptographic techniques. Each transaction is verified and recorded in a way that makes it extremely difficult to alter or forge. 2. **Decentralization:** The ledger is maintained by a network of nodes (computers) rather than a central authority. This decentralization reduces the risk of a single point of failure or malicious attack. 3. **Consensus Mechanisms:** Blockchain networks use consensus algorithms (e.g., Proof of Work, Proof of Stake) to validate and agree on the state of the ledger. This ensures that all nodes agree on the validity of transactions. **Example Scenario:** Consider a scenario where Alice wants to send 5 Bitcoins to Bob using a blockchain-based cryptocurrency. When Alice initiates the transaction, it is broadcasted to the network. Miners validate the transaction using cryptographic algorithms, and once verified, the transaction is grouped with others into a block. This block is then added to the blockchain, creating a permanent record of the transaction. The ledger is updated across all nodes in the network, providing transparency. If anyone attempts to alter the transaction, it would require the consensus of a majority of nodes, making it computationally infeasible.
05 Case Based Questions (5 Marks)	
Q1.	ABC Corporation implemented an AI-powered chatbot to enhance their customer service experience. The chatbot uses Natural Language Processing (NLP) to understand customer queries and provide relevant responses. It is designed to handle common inquiries, such as order status, product information, and troubleshooting. **Question 1:** What technology does the chatbot in this case study primarily rely on? A) Machine Learning B) Natural Language Processing (NLP) C) Computer Vision D) Neural Networks **Question 2:** What is the main purpose of implementing the chatbot? A) Enhance customer service B) Streamline internal communication C) Monitor employee performance D) Improve product development **Question 3:** What type of inquiries is the chatbot designed to handle? A) Technical support only B) Common inquiries C) Legal inquiries D) Marketing inquiries

	Question 4: How does the chatbot understand and respond to customer queries? A) Through complex algorithms B) By analyzing facial expressions C) Using Natural Language Processing (NLP) D) By accessing external databases **Question 5:** What is one potential benefit of using a chatbot in customer service? A) Decreased customer satisfaction B) Reduced response time C) Limited scalability D) Increased manual workload
Ans	*Solution 1:* B) Natural Language Processing (NLP) *Solution 2:* A) Enhance customer service *Solution 3:* B) Common inquiries *Solution 4:* C) Using Natural Language Processing (NLP) *Solution 5:* B) Reduced response time
Q2.	ABC Web Services, a web hosting company, transitioned their hosting infrastructure to the cloud. They chose a cloud provider known for its reliability and scalability. This allows ABC Web Services to easily handle fluctuations in website traffic and provide a seamless experience for their clients. *MCQ Questions:* **Question 1:** Why did ABC Web Services transition their hosting infrastructure to the cloud? A) To reduce website traffic B) To handle fluctuations in website traffic and provide scalability C) To limit their hosting options D) To decrease reliability **Question 2:** What is one benefit of using a reliable cloud provider for web hosting? A) Limited scalability options B) Reduced accessibility C) Ability to handle fluctuations in website traffic D) Decreased security **Question 3:** How does cloud hosting help ABC Web Services with scalability? A) It restricts website traffic B) It allows for easy adjustment of resources based on demand C) It limits the number of websites hosted D) It does not affect scalability **Question 4:** What is one potential benefit of using cloud hosting for web services? A) Limited control over resources B) Inability to handle fluctuations in traffic C) Improved website performance and reliability D) Higher costs compared to traditional hosting **Question 5:** What is one consideration ABC Web Services should have regarding data security when using cloud hosting? A) No need to worry about data security B) Ensuring proper security measures and encryption are in place C) Ignoring data security concerns D) Reliance solely on the cloud provider for security
Ans	*Solution 1:* B) To handle fluctuations in website traffic and provide scalability *Solution 2:* C) Ability to handle fluctuations in website traffic *Solution 3:* B) It allows for easy adjustment of resources based on demand *Solution 4:* C) Improved website performance and reliability *Solution 5:* B) Ensuring proper security measures and encryption are in place

Q3.	ABC Corporation, a global food distributor, implemented a blockchain-based supply chain solution. The system tracks the journey of food products from the farm to the consumer's table. Each step of the process, including harvesting, processing, packaging, and transportation, is recorded on the blockchain. This provides consumers with transparent and verifiable information about the origin and handling of the food they consume. *MCQ Questions:* **Question 1:** What is the primary purpose of implementing blockchain in ABC Corporation's supply chain? A) To decrease transparency in the supply chain B) To provide consumers with transparent and verifiable information about the origin and handling of food products C) To limit the tracking of food products D) To reduce the efficiency of the supply chain **Question 2:** How does the blockchain system record information in this supply chain? A) By storing physical labels on food products B) By recording each step of the process on the blockchain C) By encrypting data on a central server D) By using a centralized database **Question 3:** What benefit does the blockchain-based system provide to consumers? A) Limited information about the origin of food products B) Transparent and verifiable information about the journey of food products C) Reduced accessibility to information D) Decreased trust in the supply chain **Question 4:** What is one potential advantage of using blockchain in the food supply chain? A) Decreased consumer trust B) Enhanced traceability and accountability in the supply chain C) Limited access to information D) Increased inefficiency in tracking products **Question 5:** What type of data is primarily recorded on the blockchain in this case study? A) Financial transactions B) Information about the origin and handling of food products C) Personal identification information D) Entertainment content
Ans	*Solution1 :* B) To provide consumers with transparent and verifiable information about the origin and handling of food products *Solution 2:* B) By recording each step of the process on the blockchain *Solution3 :* B) Transparent and verifiable information about the journey of food products *Solution 4:* B) Enhanced traceability and accountability in the supply chain *Solution 5:* B) Information about the origin and handling of food products
Q4.	ABC Retail, a multinational clothing brand, integrated augmented reality (AR) into their mobile app. Customers can use the app to virtually try on clothes before making a purchase. The AR feature superimposes virtual clothing onto the customer's live video feed, allowing them to see how the clothes fit and look in real-time. *MCQ Questions:* **Question 1:** What is the main application of AR in ABC Retail's case study? A) Virtual tour of the store B) Virtual try-on of clothes C) Online payments D) Virtual store navigation **Question 2:** How does the AR feature work in the ABC Retail app? A) By providing a 360-degree view of the store B) By superimposing virtual clothing onto the customer's live video feed C) By offering augmented reality games D) By providing product descriptions **Question 3:** What is one benefit of using AR in retail for customers?

	A) Limited access to products B) Ability to virtually try on clothes before purchasing C) Reduced interaction with store staff D) Decreased product variety **Question 4:** What is one potential advantage for ABC Retail in implementing AR? A) Decreased customer engagement B) Enhanced customer experience and increased conversion rates C) Reduced use of technology D) Limited customer interaction **Question 5:** What type of technology is primarily used in this case study? A) Virtual Reality (VR) B) Augmented Reality (AR) C) Mixed Reality (MR) D) Artificial Intelligence (AI)
Ans	*Solution 1:* B) Virtual try-on of clothes *Solution 2:* B) By superimposing virtual clothing onto the customer's live video feed *Solution 3:* B) Ability to virtually try on clothes before purchasing *Solution 4:* B) Enhanced customer experience and increased conversion rates *Solution 5:* B) Augmented Reality (AR)
Q5.	XYZ Consulting, a small business, decided to migrate their data storage to the cloud. They opted for a popular cloud storage service that offers secure, scalable, and cost-effective storage solutions. The cloud storage allows XYZ Consulting to access their files from anywhere with an internet connection and enables easy collaboration among team members. *MCQ Questions:* **Question 1:** What is one benefit of using cloud storage for XYZ Consulting? A) Limited access to files B) Scalable and cost-effective storage C) Restricted collaboration options D) Dependence on physical hardware **Question 2:** Why did XYZ Consulting choose to migrate their data storage to the cloud? A) To decrease accessibility B) To limit collaboration C) To access files from anywhere with an internet connection D) To increase dependence on physical hardware **Question 3:** What is a key advantage of using a cloud storage service? A) Decreased security B) Limited storage capacity C) Easy collaboration among team members D) Higher costs compared to physical storage **Question 4:** How does cloud storage benefit XYZ Consulting in terms of scalability? A) It provides limited storage options B) It allows for easy expansion of storage capacity as needed C) It restricts access to files D) It does not affect storage capacity **Question 5:** What is one potential risk of relying solely on cloud storage? A) Limited accessibility to files B) Dependency on physical hardware C) Data security concerns D) Difficulty in collaboration
Ans	*Solution 1:* B) Scalable and cost-effective storage *Solution 2:* C) To access files from anywhere with an internet connection *Solution 3:* C) Easy collaboration among team members *Solution 4:* B) It allows for easy expansion of storage capacity as needed *Solution 5:* C) Data security concerns