

COMPUTER SCIENCE & ENTREPRENEURSHIP

9

GRADE BOOSTERS

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HTML5

CSS3

JS

MUHAMMAD ALI PHOTOSTATE ZAFARWAL**Computer Science & Entrepreneurship 9th****Unit : 1****Introduction to Computational System**

Q:1 Define System. How idea of system is useful?

Ans: A system is an organized collection of **interdependent parts** that work together to perform a specific **function** or achieve a common **goal**.

The idea of a system is useful to explain both the external reality as well as the internal one.

Q:2 What is an Information System?

Ans: An Information System is an organized set of components that works together to perform a specific function.

Q:3 How are the components of a system related?

Ans: All the components of the system are in some way related to each other and the functioning of the other components enhances the operation of the system.

Q:4 How do the components of a car work together?

Ans: Each part of a car, such as the engine, wheels and brakes, performs a unique task but they work together to make the car move.

Q:5 What is system described by?

Ans: A system is described by its objectives, components, communication among components and environment in which it works.

Q:6 Why do with components of each system communicate with each other?

Ans: The components of a system communicate with each other to achieve the system's objective in an environment.

Q:7 What are examples of simple and complex systems?

Ans: A thermostat is an example of a simple system while the human body or a computer network is an example of a complex system.

Q:8 What is the objective of a system?

Ans: Every system has a purpose or goal that it aims to fulfill efficiently. The common types of system objectives are:

- ❖ Information processing
- ❖ Supporting other systems
- ❖ Achieving specific goals

Q:9 Why does analyzing a system's operation require? What is its purpose?

Ans: Analyzing a system's operation required understanding its item. this insight improves the efficiency and efficacy of the present system.

Q:10 What is the objective of a transport system?

Ans: A transport system aims to transfer people and products securely and effectively between locations.

Q:11 What is the principal goal of a computer system?

Ans: The principal goal of a computer system is to process data and provide useful Information to users

Q:12 What are its basic components?

Ans: The basic components of a system are Objectives, Components, Communication and Environment.

Q:13 What are components in a system?

Ans: Components are the building blocks of any system. Each component plays a specific role and contributes to the overall functionality of the system.

Q:14 Why is it important to understand system components?

Ans: Understanding system components is important for identifying problems, improving performance and refining system design. The smooth and proper working of all components together ensures the system meets its objectives.

Q:15 What is the environment of a system?

Ans: The environment of a system includes everything external to the system that interacts with it. It consists of all external factors that affect the system's operation.

Q:16 Why is It Important to understand a system's environment?

Ans: Understanding the environment of a system is important as it influences the system's performance and behavior by providing Inputs and receiving outputs.

Q:17 What is the role of communication in a system?

Ans: Communication ensures that system components work together smoothly and efficiently to achieve the objectives.

Q:18 How do components interact in a computing system?

Ans: In a computing system, the CPU communicates with memory to fetch and store data for proper functioning.

Q:19 How does communication work in a biological system?

Ans: In a biological system, the brain sends signals to muscles to initiate movement and coordinate actions.

Q:20 How does a weather monitoring system interact with its environment?

Ans: A weather monitoring system collects data from environmental sensors and provides weather updates and future forecasts to users..

Q:21 How do computers interact with peripheral devices?

Ans: Computers interact with peripheral devices like printers and scanners to exchange data and perform tasks.

Q:22 How do animals interact with their environment?

Ans: Animals interact with plants and other animals, forming a food chain that supports life in an ecosystem.

Q:23 what be software? what would computers be without software?

Ans: Software is a collection of programs and instructions that tell a computer what to do and how to do. Without software, computers would be useless machines.

Q:24 Give names of types of system software?

1. software
2. Application Software

Q:25 What is system software?

Ans: System software is designed to manage the system resources and provide a platform for application software to run.

Q:26 What is the role of system software?

Ans: It acts as a bridge between the hardware and the user applications.

Q:27 Give examples of operating systems.

Ans: **Examples** include Microsoft Windows, macOS, and Linux.

Q:28 Give examples of device drivers.

Ans: These include printer drivers, graphics card drivers, and sound card drivers.

Q:29 Give examples of utility programs.

Ans: **Examples** are antivirus software, disk cleanup tools, and backup software.

Q:30 What is application software?

Ans: Application software is designed to help users perform specific tasks.

important information

❖ What was the name of the first computer virus?

The first computer virus was called "Creeper."

❖ When was the "Creeper" virus created?

It was created in 1971.

❖ What type of program was "Creeper"?

It was an experimental self-replicating program.

❖ What message did the "Creeper" virus display?

"I'm the creeper, catch me if you can!"

Q:31 Give examples of word processors.

Ans: **Examples** of word processors are Microsoft Word and Google Docs.

Q:32 Give examples of web browsers.

Ans: **Examples** of web browsers are Google Chrome, Mozilla Firefox, and Safari.

Q:33 Give examples of games software.

Ans: **Examples** of games are Minecraft, Fortnite, and Among Us.

Q:34 Give examples of media players.

Ans: **Examples** of media players are VLC Media Player and Windows Media Player.

Q:35 What is the purpose of system software?

Ans: System software manages and operates computer hardware, making it possible for application software to run.

Q:36 What is the purpose of application software?

Ans: Application software helps the user to perform specific tasks.

Q:37 Difference b/w Between System Software and Application Software?

System software	Application Software
➤ Manages and operates computer hardware.	➤ Helps the user perform specific tasks.
➤ Makes it possible for application software to run.	➤ Built to fulfill user needs.
➤ Includes operating systems and device drivers.	➤ Includes word processors, web browsers, and games.

➤ Usually pre-installed on a computer.	➤ Can be installed by the user as needed.
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Q:38 What is system software?

Ans: System software is designed to manage the system resources and provide a platform for application software to run.

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Q:42 Give examples of utility programs.

Ans: **Examples** are antivirus software, disk cleanup tools, and backup software.

Q:43 What is application software?

Ans: Application software is designed to help users perform specific tasks.

Q:44 What Is Von Neumann computer architecture? List Its key components?

Ans: The Von Neumann architecture is a computer design model proposed by John von Neumann In the **1940s**. It consists of four key components: memory, the CPU, input devices and output devices.

Q:45 What are the main components of the Von Neumann architecture?

Ans: The main components of the Von Neumann architecture are memory, the CPU, input devices and output devices.

Q:46 What is the function of memory In the Von Neumann architecture?

Ans: Memory stores Input data and instructions required for CPU processing. When a program starts, It is loaded into RAM for faster execution compared to running from a hard disk.

Q:47 What is the function of the CPU In the Von Neumann architecture?

Ans: The CPU executes instructions and performs arithmetic and logical operations. The Arithmetic Logic Unit (ALU) handles calculations and logic while the Control Unit (CU) directs CPU activities by managing instruction execution and communication with memory.

Q:48 What is the function of input devices in the Von Neumann architecture?

Ans: Input devices allow users to input data and instructions into the system using a keyboard or mouse.

Q:49 What is the function of output devices in the Von Neumann architecture?

Ans: Output devices display the results of processing using monitors and printers.

Q:50 What is the function of the data bus, address bus and control bus?

Ans: The data bus transports data between components within the computer system. The address bus maintains data destination information, ensuring data reaches the correct location. The control bus transports control electrical signals to coordinate computer operations.

Q:51 What are the four main steps in the Von Neumann architecture's Instruction cycle?

Ans: The four main steps in the Von Neumann architecture's instruction cycle are fetching, decoding, execution and storing.

Q:52 What happens during the fetching step in Von Neumann architecture?

Ans: During the fetching step, the CPU retrieves an instruction from memory. The Program Counter (PC) stores the memory address of the next instruction, which is then fetched and placed into the Instruction Register (IR).

Q:53 What happens during the decoding step in Von Neumann architecture?

Ans: During decoding, the Control Unit (CU) analyzes the instruction by decoding its opcode to determine the necessary procedures and required data.

Q:54 What happens during the execution step in Von Neumann architecture?

Ans: During execution, the CPU processes the instruction. The Arithmetic Logic Unit (ALU) performs mathematical and logical calculations while the Control Unit (CU) manages data transfers.

Q:55 What happens during the storing step in Von Neumann architecture?

Ans: The computed outcome is either stored in a designated memory location or sent to an output device, such as a display.

Q:56 Define number System. Write its importance.

A method of reposing of numeric data is called number system.

Ans: A numbering system is important in computing because it helps in representing, storing and processing data. It also enables computers to

perform, calculations, store data and transfer information.

Q:57 Give different types of number systems.

- Binary Number System.
- Decimal Number system.
- Octal Number System.
- Hexadecimal Number system.

Q:58 What is the decimal number system?

Ans: The decimal number system is a base-10 system. It represents any quantity using ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. **For example,** $(523)_{10}$

Q:59 What is the binary number system?

Ans: The binary number system is a base-2 system. It represents any quantity using only two digits: 0 and 1. Digital computers store data in the binary number system. **For example,** $(1011)_2$

Q:60 Why do computers use the binary system?

Ans: Computers use the binary system because it works well with electronic circuits, which have two states: ON (1) and OFF (0).

Q:61 How does a computer process data in binary?

Ans: When typing on the keyboard, the computer converts letters into binary code. Similarly, all types of data, including numbers, text, images and sounds are ultimately stored and processed in binary form.

Q:62 How can you convert a binary number to decimal?

Ans: Multiply each binary digit by 2 raised to the power of its position and sum the results. **For example,** $(1011)_2$

$$(1011)_2 = (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$$

$$(1011)_2 = (1 \times 8) + (0 \times 4) + (1 \times 2) + (1 \times 1)$$

$$(1011)_2 = (8 + 0 + 2 + 1)$$

$$(1011)_2 = (11)_{10}$$

Q:63 How can you convert a decimal number to binary?

Ans: Divide the number by 2 and record the quotient and remainder, Continue dividing the quotient by 2 until the quotient becomes 0 and write the remainders in reverse order to get the binary value. **For example,** $(83)_{10}$
 $(83)_{10} = (1010011)_2$

Q:64 What is the octal number system?

Ans: The octal number system is a base-8 system that uses digits from 0 to 7. Each octal digit represents three binary digits, making conversion between binary and octal simple. **For example,** $(523)_8$.

Q:65 How can you convert a binary number to octal?

Ans: Group the binary number into sets of three bits from right to left, then convert each group to its octal equivalent. **For example,** $(110101011)_2$

Q:66 How can you convert a decimal number to octal?

Ans: Divide the number by 8 and record the quotient and remainder. Continue dividing the quotient by 8 until the quotient becomes 0 and write the remainders in reverse order to get the octal value.

For example, $(83)_8$ to octal:

8	83
8	10 – 3
8	1 – 2
	0 – 1

More examples:

convert these decimal numbers to octal numbers. 45, 128, 64

Q:67 How can you convert an octal number to decimal?

Ans: Multiply each octal digit by 8 raised to the power of its position and sum the results. **For example,** $(124)_8$

$$(124)_8 = (1 \times 8^2) + (2 \times 8^1) + (4 \times 8^0)$$

$$(124)_8 = (1 \times 64) + (2 \times 8) + (4 \times 1)$$

$$(124)_8 = (64 + 16 + 4)$$

$$(124)_8 = (84)_{10}$$

More examples:

Convert these octal numbers to decimal numbers. 57, 301

Q:68 What is the hexadecimal decimal number system?

Ans: The hexadecimal number system is a base-16 system that uses digits 0-9 and letters A-F (where A = 10, B = 11, C = 12, D = 13, E = 14, F = 15) **For example,** $(1A3)_{16}$

Q:69 How can you convert a hexadecimal number to decimal?

Ans: Multiply each hexadecimal digit by 16 raised to the power of its position and sum the results. **For example,** $(1A3)_{16}$

$$(1A3)_{16} = (1 \times 16^2) + (A \times 16^1) + (3 \times 16^0)$$

$$(1A3)_{16} = (1 \times 256) + (10 \times 16) + (3 \times 1)$$

$$(1A3)_{16} = 256 + 160 + 3$$

$$(1A3)_{16} = (419)_{10}$$

2	83		
2	41	–	1
2	20	–	1
2	10	–	0
2	5	–	0
2	2	–	1
2	1	–	1
	0	–	1

Q:70 How can you convert a binary number to hexadecimal?

Ans: Divide the binary number into groups of four bits, starting from the right. If the number of bits is not a group of four, add leading zero(s) to the left. Convert each group into its corresponding hexadecimal digit.

For example, $(1101011010110010)_2$

$1101 = 13 \rightarrow D$

$0110 = 6 \rightarrow 6$

$1011 = 11 \rightarrow B$

$0010 = 2 \rightarrow 2$

$(1101011010110010)_2 = (D6B2)_{16}$

Q:71 How can you convert a decimal number to hexadecimal?

Ans: Divide the number by 16 and record the quotient and remainder. Continue dividing the quotient by 16 until the quotient becomes 0 and write the remainders in reverse order to get the hexadecimal value.

For example, $(2297)_{10}$

16	2297
16	$143 - 9 \rightarrow 9$
16	$8 - 15 \rightarrow F$
	$0 - 8 \rightarrow 8$

$(2297)_{10} = (8F9)_{16}$

2.2 Data Representation in Computing Systems

Q:72 What is binary encoding in computing?

Ans: Binary encoding is the method of representing numbers in computers using binary digits..

Q:73 Why are whole numbers commonly used in computing for quantities that cannot be negative?

Ans: They accurately represent values like age, student count or grades. Using unsigned integers ensures efficient storage and allows a larger range of positive values.

Q:74 What are whole numbers in computing?

Ans: Whole numbers are non-negative integers, including zero, used to represent quantities that cannot be negative.

Q:75 What are signed Integers?

Ans: Signed Integers include both positive and negative numbers, with the most significant bit reserved for the sign.

Q:76 What is 1's Complement?

Ans: 1's Complement is a binary number representation system used to express positive and negative numbers in digital systems. Negative

numbers are represented by inverting all the bits (changing 0s to 1s and 1s to 0s).

Q:77 How are negative values stored in computers?

Ans: Computers store negative values using a method called 2's Complement.

Q:78 How do you find the 2's Complement of a binary number?

Ans: To find the 2's Complement of a binary number, first invert all the bits and then add 1 to the result.

2.4 Binary Arithmetic Operations

Q:79 What are the basic arithmetic operations in binary?

The basic arithmetic operations in binary are addition, subtraction, multiplication and division.

Q:80 Solve: $(1101)_2 (1011)_2$

$(1101)_2$
$+ (1011)_2$
$(11000)_2$

Q:81 Subtract 6 from 9 in binary.

Ans: Convert 6 and 9 to binary:

$9 = (1001)_2$

$6 = (0110)_2$

Two's complement of 6 invert the bits of 6 = $(1001)_2$

Add 1 to the inverted bits:

$(1001)_2$

$+ (1)_2$

$(1010)_2$

$(1010)_2 = -6$

Add 9 and the two's complement of 6

$(1001)_2$

$+ (1010)_2$

$(10011)_2$

Discard the carry bit

$(0011)_2 = (3)_{10}$

So, $9 - 6 = 3$

Q:82 How can you multiply binary numbers?

Ans: Binary numbers are multiplied by aligning them by the least significant bit, multiplying each bit, shifting partial results left and adding them to get the final product.

Q:83 Multiply two binary numbers: $(101)_2$ and $(11)_2$.

$(101)_2$
$\times (11)_2$
101
101×
$(1111)_2$

Q:84 What are the steps of binary division?

Ans: The steps of, binary division Include comparing, subtracting, shifting and repeating the process until all digits of the dividend are used.

Divide two binary numbers: $(1100)_2$ by $(10)_2$

$\begin{array}{r} 100 \\ 10 \overline{)1100} \\ \underline{-10} \\ 10 \\ \underline{-10} \\ 0 \end{array}$	Do Yourself: 1. $(10101)_2 \div (10)_2 = (1010)_2$ 2. $(11100)_2 \div (11)_2 = (1010)_2$ 3. $(100110)_2 \div (101)_2 = (111)_2$
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$$(1100)_2 / (10)_2 = (110)_2$$

2.5 Common Text Encoding Schemes

Q:85 What does ASCII stands for and what is its purpose?

Ans: ASCII stands for American Standard Code for Information Interchange. It is used for character encoding in computers and similar devices.

Q:86 What is the primary purpose of the ASCII encoding scheme?

Ans: The primary purpose of ASCII encoding scheme is to represent characters as numerical codes. It allows computers to process and exchange text reliably.

Q:87 What is the ASCII code for 'A' and 'a'?"

Ans: The ASCII code for 'A' is 65 and for 'a' is 97.

Q:88 What is Extended ASCII?

Ans: Extended ASCII is a character encoding system that includes 256 characters and uses 8 bits, adding additional symbols, accented letters and other characters...

Q:89 How does Unicode handle characters from different languages?

Ans: Unicode is a system that maps all graphic characters used in the world's writing systems and can represent over a million characters using encodings like UTF-8, UTF-16 and UTF-32.

Q:90 Explain the difference between ASCII and Unicode.

Ans: ASCII is a 7-bit-encoding that can represent only 128 characters, mainly for English text. Unicode supports over a million characters and includes multiple languages using encodings like UTF-8, UTF-16 and UTF-32.

Q:91 What is UTF-8?

Ans: UTF-8 is a variable-length encoding scheme that uses 1 to 4 bytes per character and is backward compatible with ASCII, allowing it to read both old and new texts. **For example,**

- ❖ The letter 'A' is mapped to U+0041 in Unicode.
- ❖ The Urdu letters 'ب' mapped to U + 0628 in Unicode.

Q:92 What is UTF-26?

Ans: UTF-16 is a variable character encoding mechanism that uses either 2 bytes or 4 bytes per

character. Unlike UTF-8, it is not compatible with ASCII and cannot translate ASCII code.

Q:93 What is UTF-32?

Ans: UTF-32 is a character encoding method that uses a fixed length of 4 bytes per character. It is simple in design but can be inefficient in terms of space usage.

Q:94 How are Images, audio and video files stored on a computer?

Ans: They are stored as binary data, represented by sequences of 0s and 1s.

Q:95 What is the difference between a Hard Disk Drive (HDD) and a Solid State drive (SSD)?

Ans: An HDD uses spinning disks to read and write data and offers large storage capacity, while an SSD uses flash memory, providing faster access times and better performance.

Q:96 What is cloud storage?

Ans: Cloud storage stores files on remote servers accessible via the internet. It provides flexibility and backup options.

Important Information

Data size is usually expressed in byte and its multiples.

Memory Unit		Memory Size	
Bit	(Binary Integer)	0 or 1	
Nibble		4 bits	
1 Byte (B)		8 bits	
1 Kilobyte (KB)		1KB = 1024 bytes	
1 Megabyte (MB)		1MB = 1024 KB	0 (1024) ² bytes
1 Gigabyte (GB)		1GB = 1024 MB	0 (1024) ³ bytes
1 Terabyte (TB)		1TB = 1024 GB	0 (1024) ⁴ bytes
1 Petabyte (PB)		1PB = 1024 TB	0 (1024) ⁵ bytes
1 Exabyte (EB)		1EB = 1024 PB	0 (1024) ⁶ bytes
1 Zettabyte (ZB)		1ZB = 1024 EB	0 (1024) ⁷ bytes
1 Yottabyte (YB)		1YB = 1024 ZB	0 (1024) ⁸ bytes

Exercise Short Questions:

Q.1: Define a system & enlist its basic parts.

Ans: A system is an organized collection of interdependent parts that work together to perform a specific function or achieve a common goal. The basic components of a system include Input, Processing and Output devices.

Q.2: Enlist the main components of the Von Neumann architecture?

Ans: Memory, Central Processing Unit (CPU), Input & Output.

Q.3: Enlist the four main steps in the Von Neumann architecture's instruction cycle?

Ans: Fetching, Decoding, Execution & Storing.

Q.4: What is a key advantage of the Von Neumann architecture?

Ans: **Simplified Design:** By combining instructions and data into a single memory area, architecture is simplified.

Q.5: What is the primary purpose of the ASCII encoding scheme?

Ans: ASCII is an acronym that stands for American Standard Code for Information Interchange. It is a character encoding standard adopted for representing in devices such as computers and similar systems that use text. Each alphabet, number or symbol is given a code number between 0 and 127.

Q.6: Define Unicode.

Ans: Unicode is an attempt at mapping all graphic characters used in any of the world's writing system. Unicode can represent over a million characters through different forms of encodings such as, UTF-8, UTF-16, and UTF-32. UTF is an acronym that stands for Unicode Transformation Format.

Q.7: How does the number of bits affect the range of integer values?

Ans: The number of bits directly affects the integer value. The more bits there are, the larger the value that can be represented. Each additional bit doubles the range of representation.

Q.8: Define system software and provide two examples.

Ans: System software is designed to manage the system resources and provide a platform for application software to run. It acts as a bridge

between the hardware and the user applications.

➤ **Operating Systems:** Examples include Microsoft Windows, macOS, and Linux.

➤ **Device Drivers:** These include printer drivers, graphics card drivers, and sound card drivers.

➤ **Utility Programs:** Examples are antivirus software, disk cleanup tools, and backup software.

Q.9: Differentiate between system software and application software.

Ans:

➤ **Purpose:** System software manages and operates computer hardware, making it possible for application software to run. Application software helps the user to perform specific tasks.

➤ **Examples:** System software includes operating systems and device drivers. Application software includes word processors, web browsers, and games.

➤ **Installation:** System software is usually pre-installed on a computer, while application software can be installed by the user as needed.

Q.10: Add 1100_2 and 1011_2

Ans:

1100

1011 +

10111

Q.11: Subtract 0011_2 from 1010_2

Ans: Subtract $3(0011)_2$ from $10(1010)_2$ in Binary

Minuend = $10_{10} = 1010_2$

Subtrahend = $3_{10} = 0011_2$

➤ **Step 1: Find the Two's Complement of the Subtrahend:**

Invert the bits of 0011_2 : Inversion: 1100_2

Add 1 to the inverted number:

$1100_2 + 1_2 = 1101_2 = 3_{10}$

➤ **Step 2: Add the Minuend and the Two's Complement of the Subtrahend**

$1010_2 + 1101_2 = 10111_2$

➤ **Step 3: Discard the Carry Bit**

10111_2 Discard carry $0111_2 = 7_{10}$ So, $10 - 3 = 7$

Unit : 2**SYSTEM DESIGN & TROUBLESHOOTING**

Q.1: What are Digital Systems?

Ans: Digital systems are the backbone of today's electronics and computing systems. They

manipulate digital information in the form of binary digits, which are either 0 or 1.

Q.2: Where did the digital systems used?

Ans: Digital systems used in calculating devices such as calculators and computers, among others.

Q.3: What are Analog signals?

Ans: Analog signals that changes with time smoothly and continuously. They can have any value within given range. Examples include voice signal, body's temperature and radio-wave signals.

Q.4: What are Digital signals?

Ans: Digital signals are the signals which have only two values that are in the form of '0' and '1'. These are utilized in digital electronics and computing systems.

Q.5: Difference between Analog and Digital Signals?

Ans: See Q 3 and 4.

Q.6: What is meant by Analog to Digital Conversion (ADC)?

Ans: ADC is the conversion of analog signals into digital signals, which are discrete and can be easily processed by computerized devices like computers, smart phones and microphones.

Q.7: What is meant by Digital to Analog Conversion (DAC)?

Ans: DAC is the conversion whereby Digital signals are converted to Analog signals, making it possible for human to perceive the information.

Q.8: Why is it needed ADC and DAC Conversion?

Ans: Digital to analog conversion and analog to digital conversion, is critical since it enables data processing, storage, and transmission.

Q.9: What is Boolean algebra?

Ans: Boolean algebra is a branch of mathematics relate to logic and symbolic computation, using two values namely True and False.

Q.10: Who invented Boolean algebra in which year?

Ans: George Boole, a mathematician who invented Boolean algebra was born in Lincoln, England in the year 1815.

Q.11: What are Binary Variables?

Ans: Binary variables that can have only two values, 0 and 1.

Q.12: What is meant by Logic Operations?

Ans: Logic operations are basic operations implemented in Boolean algebra for processing of these binary variables. The primary logic operations are AND, OR and NOT.

Q.13: What is Truth Table?

Ans: A truth table is useful in demonstrating the functionality of the logic operation with all possible inputs of the variables.

Q.14: What is AND Operation?

Ans: It requires two binary inputs which will give a single binary output. The symbol '.' is used for the AND operation. The output of the AND operation is "1" only when both inputs are "1". Otherwise, the result is "0".

• **Truth Table:**

A	B	A AND B
0	0	0
0	1	0
1	0	0
1	1	1

Q.15: What is OR Operation?

Ans: It requires two binary inputs which will give a single binary output. The symbol '+' is used for the OR operation. The output of the OR operation is "1" when at least one inputs is "1".

• **Truth Table:**

A	B	A OR B
0	0	0
0	1	1
1	0	1
1	1	1

Q.16: What is NOT Operation?

Ans: The NOT operations which takes a single binary variable and simply negates its value. If the input is one, the output is zero and if the input is zero, the output is one.

• **Truth Table:**

A	NOT A
0	1
1	0

Q.17: What does mean by Boolean Functions?

Ans: A Boolean function is a function which has a one or more binary inputs and produces a single binary output. The inputs and outputs can only have two values: False (0) and True (1).

Q.18: How can we construct Boolean function?

Ans: The construction of Boolean functions is done by employing the basic logical operations such as AND, OR and NOT, which connect the inputs to generate the correct output.

Q.19: What is the Usage of Boolean function in Computers?

Ans: There are many uses of Boolean functions in the computers for various operations. Here are some examples of their usage:

- **Arithmetic Operations:** Boolean functions are used in Arithmetic and Logic Units (ALUs) of CPUs to perform operations like addition, subtraction, multiplication, and even division.
- **Data Processing:** Boolean functions are used to process binary data in memory and storage devices, ensuring efficient data manipulation and retrieval.
- **Control Logic:** Boolean functions are applied in computers to control various parts of the system's operation to function in coordinated manner.

Q.20: What are Logic Gates?

Ans: Logic gates are physical devices in electronic circuits that perform Boolean operations.

Q.21: What is AND Gate?

Ans: Implements the AND function. It outputs true only when both inputs are True (1).



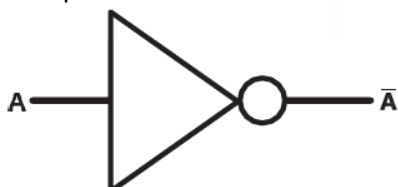
Q.22: What is OR Gate?

Ans: Implements the OR function. It outputs true when at least one input is true.



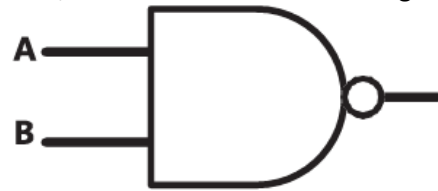
Q.23: What is NOT Gate?

Ans: Implements the NOT function. It outputs the opposite of the input.



Q.24: What is NAND Gate?

Ans: This gate is achieved when an AND gate is combined with a NOT gate. It generates true when at least one of the inputs is false. In other words, it is the inverse of the AND gate.



Q.25: What is XOR Gate?

Ans: The XOR (Exclusive OR) gate outputs true only when exactly one of the inputs is true. It differs from the OR gate, that it does not output true when both inputs are true.



➤ **Basic Boolean algebra Rules:**

Here are some fundamental Boolean algebra rules used for simplification:

1. **Identity Laws** $A + 0 = A$ $A \cdot 1 = A$
2. **Null Laws** $A + 1 = 1$ $A \cdot 0 = 0$
3. **Idempotent Laws** $A + A = A$ $A \cdot A = A$
4. **Complement Laws** $A + \bar{A} = 1$ $A \cdot \bar{A} = 0$
5. **Commutative Laws** $A + B = B + A$
 $A \cdot B = B \cdot A$
6. **Associative Laws** $(A + B) + C = A + (B + C)$
 $(A \cdot B) \cdot C = A \cdot (B \cdot C)$
7. **Distributive Laws** $A \cdot (B + C) = (A \cdot B) + (A \cdot C)$
 $A + (B \cdot C) = (A + B) \cdot (A + C)$
8. **Absorption Laws** $A + (A \cdot B) = A$ $A \cdot (A + B) = A$
9. **De Morgan's Theorems** $A + B = \overline{\bar{A} \cdot \bar{B}}$
 $A \cdot B = \overline{\bar{A} + \bar{B}}$
10. **Double Negation Law** $\sim \sim A = A$

Q.26: What is System Troubleshooting?

Ans: When something goes wrong in systems, troubleshooting helps identify the problem and find a solution quickly.

Q.27: Why troubleshooting is essential?

Ans: Troubleshooting is essential for maintaining the smooth operation of systems, whether they are computers, machines, or other types of equipment.

Q.28: What are the Systematic Process of Troubleshooting?

Ans: A systematic approach to troubleshooting involves the following steps:

1. Identify Problem
2. Establish a Theory of Probable Cause
3. Test the Theory to Determine the Cause
4. Establish a Plan of Action to Resolve the Problem
5. Implement the Solution
6. Verify Full System Functionality
7. Document Findings, Actions, and Outcomes

Q.29: What is Identify Problem?

Ans: The first step in troubleshooting is to identify the problem. This means recognizing that something is not working as it should. For example, if you press power button and your laptop does not turn on, the problem is clear that it won't start.

Q.30: What is Establish a Theory of Probable Cause?

Ans: This involves thinking about what could have gone wrong. For example, if your laptop does not turn on, possible causes might be a dead battery, a faulty power cord, or an internal hardware issue.

Q.31: What is Test the Theory to Determine the Cause?

Ans: This involves checking if the suspected cause is actually the reason for the problem. For example, if you think the laptop's battery is dead, you can test this theory by plugging in the power cord and seeing if the laptop turns on.

Q.32: What is Establish a Plan of Action to Resolve the Problem?

Ans: This means deciding what steps you need to take to resolve the issue. For example, if the problem is a dead battery, your plan of action might be to replace the battery or keep the laptop plugged in until you can get a new one.

Q.33: What is Implement the Solution?

Ans: Once you have a plan, you need to put it into action. For example, if your plan is to replace the battery, you would buy a new battery and install it in your laptop.

Q.34: What is Verify Full System Functionality?

Ans: After implementing the solution, you need to check to make sure that the problem is fully resolved and the system is working properly again. For example, once you replace the battery, you should check to see if the laptop turns on and operates as expected without plugging in the power cord.

Q.35: What is Documentation?

Ans: The final step is to document everything you did during the troubleshooting process.

Q.36: What is the Importance of Troubleshooting in Computing Systems?

Ans: Troubleshooting is very important in computing systems because it helps keep our computers, software, and networks running smoothly.

➤ **Preventing Downtime:** Downtime occurs when a computer system is not operational. This can be very costly, especially in businesses that rely on their systems to operate efficiently.

➤ **Ensuring Data Integrity:** Troubleshooting helps identify the source of data corruption and prevent it from happening again, ensuring that data remains accurate and reliable.

➤ **Improving Security:** Troubleshooting can help identify weakness and security breaches to protect the system.

➤ **Enhancing Performance:** Troubleshooting can identify the reasons for slow performance.

➤ **Extending Equipment Life:** Regular troubleshooting and maintenance can help extend the life of computer equipment.

➤ **Saving Costs:** Effective troubleshooting can save money by reducing the need for expensive repairs or replacements.

Q.37: What are the Common Hardware Issues?

Ans:

1. Cable Disconnection
2. Overheating
3. Peripheral Devices: Not being recognized.

Q.38: What is Cable Disconnection and its solution?

Ans: Loose or disconnected cables are a common hardware issue that can cause devices to stop working. **Solution:** Use cable ties or organizers to keep cables neat and out of the way.

Q.39: What is Overheating and its solution?

Ans: Overheating can cause a computer to slow down, freeze, or shut down unexpectedly. **Solution:** Proper ventilation is crucial to prevent overheating and ensure the computer runs efficiently.

Q.40: What are Peripheral Devices Issues and its solution?

Ans: Peripheral devices like keyboards, mouse, LED can have various issues, from not being recognized by the computer to not working correctly. **Solution:** Replace relevant peripheral device like keyboard, mouse or LCD.

Q.41: What are the Recognizing Hardware Failures?

Ans:

1. RAM Failures
2. Hard Drive Failures

Q.42: What are the Signs of RAM Failures?

Ans: Common signs of RAM issues include frequent system crashes, Blue Screens Of Death (BSOD), and poor performance.

Q.43: What are the RAM Diagnostic Tools?

Ans: Use built-in tools like Windows Memory Diagnostic or third-party applications like MemTest86 to check for RAM issues.

Q.44: What are the Signs of Hard Drive Failures?

Ans: Symptoms of hard drive failures include strange noises (like clicking), slow performance, frequent crashes, and corrupted files.

Q.45: What are the Hard Drive Diagnostic Tools?

Ans: Use tools like SMART (Self-Monitoring, Analysis, and Reporting Technology) status checks, or software like Crystal Disk Info, to monitor hard drive health.

Q.46: Why we do Replacement and Upgradation of Components?

Ans: Upgrading or replacing hardware components can significantly improve your computer's performance and extend its lifespan.

Q.47: What should we do to Replace RAM?

Ans: To replace RAM, first determine the type and maximum capacity support. Also compatible to your motherboard.

Q.48: What should we do to Replacing a Hard Drive?

Ans: To replace a hard drive, back up your data, purchase a compatible drive.

Q.49: What does mean by Security and Maintenance?

Ans: Understanding and applying regular maintenance and security measures are essential for the proper and continued performance of a system.

Q.50: What is meant by Maintaining Software?

Ans: Keeping software up to date and resolving a conflict is essential for security and performance.

1. Installing Updates and Software Patches Regularly
2. Resolving Software Conflicts

Exercise Short Questions:

Q.1: Define a Boolean function.

Ans: A Boolean function is a function which has a one or more binary inputs and produces a single binary output. The inputs and outputs can only have two values: False (0) and True (1).

Q.2: What is the significance of the truth table in digital logic?

Ans: A truth table is useful in demonstrating the functionality of the logic operation with all possible inputs of the variables.

Q.3: Describe the function of a NOT gate with its truth table.

Ans: Implements the NOT function. It outputs the opposite of the input.

The NOT operations which takes a single binary variable and simply negates its value. If the input is one, the output is zero and if the input is zero, the output is one.

• **Truth Table:**

A	NOT A
0	1
1	0

Q.4: Write the purpose of ADC and DAC.

Ans: ADC is the conversion of analog signals into digital signals, which are discrete and can be easily processed by computerized devices like computers, smart phones and microphones. DAC is the conversion whereby Digital signals are converted to Analog signals, making it possible for human to perceive the information.

Q.5: Make the truth of two variable A, B for AND operation.

Ans: It requires two binary inputs which will give a single binary output. The symbol '.' is used for the AND operation. The output of the AND operation is "1" only when both inputs are "1". Otherwise, the result is "0".

• **Truth Table:**

A	B	A AND B
0	0	0
0	1	0
1	0	0
1	1	1

Q.6: What is the first step in the systematic process of troubleshooting?

Ans: The first step in troubleshooting is to identify the problem. This means recognizing that something is not working as it should. For example, if you press power button and your laptop does not turn on, the problem is clear that it won't start.

Q.7: After identifying a problem, what is the next step in troubleshooting?

Ans: This involves thinking about what could have gone wrong. For example, if your laptop does not turn on, possible causes might be a dead battery, a faulty power cord, or an internal hardware issue.

Q.8: Describe the importance of testing a theory during the troubleshooting process

Ans: This involves checking if the suspected cause is actually the reason for the problem. For example, if you think the laptop's battery is dead, you can test this theory by plugging in the power cord and seeing if the laptop turns on.

Q.9: Explain what the "Implement the Solution" step entails in a troubleshooting.

Ans: Once you have a plan, you need to put it into action. For example, if your plan is to replace the battery, you would buy a new battery and install it in your laptop.

Q.10: Why is it necessary to verify full system functionality after implementing a solution?

Ans: After implementing the solution, you need to check to make sure that the problem is fully resolved and the system is working properly again. For example, once you replace the battery, you should check to see if the laptop turns on and operates as expected without plugging in the power cord.

Unit: 3

Computer Networks

Q.1: What is a Network?

Ans: A computer network is a system of linked devices and computers that may exchange data and operate together.

Q.2: What are the primary components of network system?

Ans:

1. Nodes
2. Links
3. Switches
4. Routers

Q.3: Define Nodes?

Ans: Devices that are connected to the network, such as computers, smartphones, and printers.

Q.4: What is Links?

Ans: The connections between nodes, which can be wired (Ethernet cables) or wireless (Wi-Fi).

Q.5: What are Switches?

Ans: Devices that connect multiple nodes within a network to forward data.

Q.6: Define Routers?

Ans: Devices that connect different networks and direct data packets between them

Q.7: What is Internet or Network of networks?

Ans: The Internet is the largest network, connecting all the networks worldwide! It is also called network of networks.

Q.8: What are the Objectives of Computer Networks?

Ans: The primary objective of computer network is to enable resource sharing, data communication and collaboration:

1. Resource Sharing: Computer networks allow devices to share resources, such as printers and

storage, reducing costs and improving efficiency.

Example: In an office network, multiple computers can share a single printer, reducing the need for multiple printers.

2. Data Communication: Networks facilitate data transfer, enabling communication through emails, instant messaging, and video conferencing.

Example: Employees in different locations can collaborate through video conferencing tools like Zoom or Microsoft Teams.

3. Connectivity and Collaboration: Networks connect devices, allowing for remote access and collaboration, improving productivity and flexibility.

Example: A team can work on a shared document in real-time using cloud based services like Google Drive.

Q.9: Who invented the WWW?

Ans: The World Wide Web (WWW) was invented by Tim Berners-Lee in 1989, revolutionizing how we access and share information.

Q.10: What is Data Communication?

Ans: Data communication involves the exchange of data between a sender and a receiver through a communication medium. Key components include the sender, receiver, message, protocol, and medium.

Q.11: Components of Data Communication

Ans: It comprises of five basic components:

1. Sender: The device that sends the data.

Example: A computer sending an email.

2. Receiver: The device that receives the data.

Example: A smartphone receiving the email.

3. Message: The data being communicated.

Example: The content of the email.

4. Protocol: A set of rules governing data communication.

Example: The HTTP protocol used for web communications.

5. Medium: The physical or wireless path through which data travels.

Example: Ethernet cable or Wi-Fi.

Q.12: What are Networking Devices?

Ans: Networking devices include hubs, switches, routers, and access points are responsible for the management and direction of network traffic.

Q.13: Define Switch?

Ans: Switch is a network device that connects multiple network devices such as computers, printers, and servers, within a network and allows these devices to communicate with each other efficiently.

Q.14: What is important role of Switch?

Ans: Switches play an important role in modern networks by efficiently managing data traffic and ensuring that information reaches the correct device.

Q.15: How Does a Switch Work?

Ans: A switch is used at the Data Link layer. It uses hardware address of a device called Media Access Control (MAC) addresses to forward data to the correct device.

Q.16: What is MAC Address?

Ans: A MAC Address is a unique, permanent ID number assigned to every device that can connect to a network. It is used for identification directly on your local network (like in your home or office).

Q.17: Define Router?

Ans: A router is a networking device that interconnects networks or allows devices to connect to it. It directs data packets between different networks. Think of it as a traffic director on the internet, making sure that data gets from one place to another efficiently.

Q.18: How Does a Router Work? / Define Packet?

Ans: When you send data on Internet it is divided into small segments called Packets. Each packet contains part of the data and the address of the destination. The main job of router is to find the best path for each data packet to deliver its destination.

Q.19: What is Access Point?

Ans: An Access Point (AP) is a networking device that facilitates the connection of wireless devices to

a wired network. It works as a link between your computers and smartphones or any other wireless device and the internet.

Q.20: How Does an Access Point Work?

Ans: An Access Point works by receiving data from the wired network and transmitting it wirelessly to your devices. It also receives data from your wireless devices and sends it to the wired network.

Q.21: What are Network Topologies?

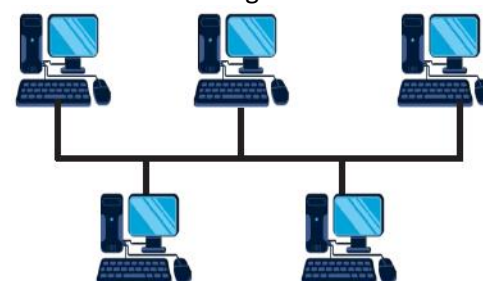
Ans: Network topologies are methods used to define the arrangement of different devices in a computer network, where each device is called a node. The reliability and performance of a network are impacted by the way its devices are linked.

Q.22: What is Bus Topology?

Ans: In a Bus topology, all devices share a single communication line called a bus. Each device is connected to this central cable.

➤ **Advantage:** Bus topology is easy to set up

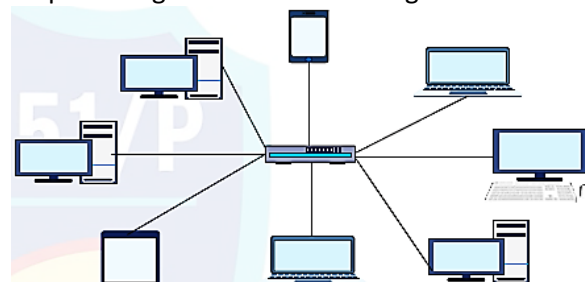
➤ **Disadvantage:** if the main cable fails, the whole network goes down.



Q.23: What is Star Topology?

Ans: In a star topology each node in network communicates with the others via a central switch or hub. The hub works as a data flow repeater.

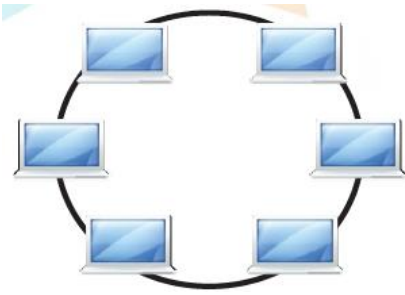
Disadvantage: In star topology if hub/ switch stop working the whole network goes down.



Q.24: What is Ring Topology?

Ans: In a Ring topology, each device is connected in a circular pathway with two other devices. Data travels in one direction, passing through each device.

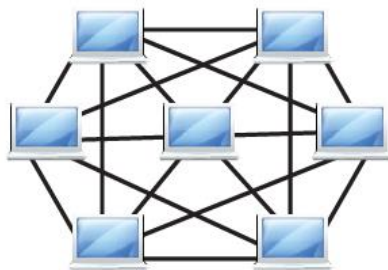
- **Advantage:** Ring topology can handle high traffic.
- **Disadvantage:** if one connection fails, the whole network is affected. Then 2-way ring can solve this issue to some extent.



Q.25: What is Mesh Topology?

Ans: In a Mesh topology, each device is connected to every other device. This provides high redundancy and reliability.

Advantage: Mesh topology is very reliable because if one link fails, data can be rerouted through other links.



Q.26: What is Transmission Modes?

Ans: Network communication modes describe how data is transmitted between devices. There are three primary modes: Simplex, Half-Duplex, and Full-Duplex.

Q.27: Define Simplex Communication?

Ans: In Simplex communication, data transmission is unidirectional, meaning it flows in only one direction. An advice can either send or receive data in this communication.

Example: Keyboard to computer is an example of simplex communication.

Q.28: Define Half-Duplex Communication?

Ans: In Half-Duplex communication, data transmission can occur in both directions, but not simultaneously. One device must wait for the other to finish transmitting before it can start.

Example: walkie-talkies

Q.29: What is Full-Duplex Communication?

Ans: Full-duplex communication allows for simultaneous data delivery in both directions. Both devices may transmit and receive data simultaneously at the same time.

Example: Telephone conversation is an example of Full-Duplex communication.

Q.30: What is The OSI Networking Model?

Ans: The Open Systems Interconnection (OSI) Model is a framework used to understand how different networking protocols interact. It has 7 layers, each with a specific function.



Layer 1: Physical Layer

The Physical Layer is liable for the actual connection between devices. The process of sending unprocessed data bits via a physical medium is the focus here.

Example: Imagine the hardware that connects computers, like a Network interface cables, repeaters, hubs and connectors.

Layer 2: Data Link Layer

Error detection and correction, as well as node-to-node data transport, are handled by the Data Link Layer. It ensures error-free data transmission from the Physical Layer.

Example: Think of the Data Link Layer as traffic lights at intersections, which manage the flow of cars (data) and prevent collisions.

Layer 3: Network Layer

The Network Layer is responsible for data transfer between different networks. It determines the best path for data to travel from the source to the destination.

Example: Imagine a GPS system finding the best route for you to travel from home to school.

Layer 4: Transport Layer

The Transport Layer ensures that data is transferred from source system to destination system. It manages data flow control and error checking.

Example: Think of the Transport Layer as a delivery service that ensures your package arrives safely and on time.

Layer 5: Session Layer

The Session Layer manages sessions between applications. It establishes, maintains, and terminates connections between devices.

Example: Imagine a phone call where the session layer sets up the call, keeps it connected, and ends it when you hang up.

Layer 6: Presentation Layer

The Presentation Layer translates data between the application layer and the network. It formats and encrypts data to ensure it is readable by the receiving system.

Example: Think of the Presentation Layer as a translator converting a book from one language to another so that more people can read it.

Layer 7: Application Layer

The Application Layer is the closest to the end user. It provides network services directly to applications, such as email, web browsing, and file transfer.

Example: Imagine the Application Layer as a waiter taking your order in a restaurant and bringing your food.

Q.31: What is IP Address?

Ans: Internet Protocol (IP) addresses are unique identifiers assigned to devices connected to the Internet. There are two primary versions: IPv4 and IPv6.

Q.32: Internet Protocol version 4 (IPv4):

Ans: IPv4 is the fourth version of the Internet Protocol and the most widely used today. It uses a 32-bit address scheme, allowing for approximately 4.3 billion unique addresses. To find the total number of unique IPv4 addresses, we calculate 2^{32} , which represents all possible combinations of 32 bits, i.e., $2^{32} = 4,294,967,296$.

Example: 172.16.254.1

Q.33: Internet Protocol version 6 (IPv6):

Ans: IPv6 is the most recent version of the Internet Protocol designed to replace IPv4. It uses a 128-bit address scheme, allowing for an almost limitless number of unique addresses.

Example: 2001:0000:130 F: 0000: 0000: 0900: 876A: 130B

Q.34: Why was IPv6 developed?

Ans: IPv6 was developed to address the depletion of IPv4 addresses due to the rapid growth of the internet and connected devices.

Q.35: What is Network Protocols?

Ans: Protocols are sets of rules that govern data communication. Common protocols include TCP/IP, HTTP, FTP and SMTP.

Example: Hyper Text Transfer Protocol (HTTP) is used for transferring web pages over the internet.

Q.36: What is Domain Name System (DNS)?

Ans: DNS translates domain names to IP addresses, making it easier for users to access websites.

Example: When you type **example.com** in a browser, DNS translates it to the corresponding IP address.

Q.37: What is Dynamic Host Configuration Protocol (DHCP)?

Ans: DHCP automatically assigns IP addresses to devices on a network, simplifying network management.

Example: When a device connects to a Wi-Fi network, DHCP assigns it an IP address.

Q.38: What is Transmission Control Protocol / Internet Protocol (TCP/IP)?

Ans: TCP/IP (Transmission Control Protocol/Internet Protocol) is the fundamental suite of protocols for internet communication.

- **Transmission Control Protocol (TCP):** Ensures reliable data transfer.
- **Internet Protocol (IP):** Handles addressing and routing of data packets.
- **User Datagram Protocol (UDP):** Provides faster, but less reliable, data transfer.

Q.39: What is Network Security?

Ans: Network security involves measures to protect data and prevent unauthorized access to computer networks.

Q.40: What is the Importance of Network Security?

Ans: Network security is important for several reasons:

- **Data Protection:** Ensuring that sensitive information is not accessed or altered by unauthorized users.
- **Preventing Attacks:** Defending against malicious attacks that can disrupt networks and steal data.
- **Maintaining Privacy:** Safeguarding personal and confidential information from being compromised.
- **Ensuring Availability:** Ensuring that network resources are available and accessible to authorized users.

Q.41: What are the Network Security Methods?

- Ans:**
- **Firewalls:** Monitor and control incoming and outgoing network traffic.
 - **Encryption:** Protects data by converting it into a secure format.
 - **Antivirus Software:** Detects and removes malicious software.

Q.42: What are the Types of Networks?

Ans: Networks are classified based on their size, range, and purpose. PAN, LAN, MAN, WAN and CAN.

Q.43: What is Personal Area Network (PAN)?

Ans: A PAN is a small network used for communication between personal devices, such as smartphones, tablets, and laptops, within a short range.

Example: Bluetooth connections between a smartphone and a wireless headset form a PAN.

Q.44: What is Local Area Network (LAN)?

Ans: A LAN is a network that connects computers and devices within a limited area, such as a home, school, or office building.

Example: The computer network in your school that connects all the computers in the lab is a LAN.

Q.45: What is Metropolitan Area Network (MAN)?

Ans: A MAN is a network that spans a city or a large campus, connecting multiple LANs together.

Example: The network that connects various branches of a university across a city is a MAN.

Q.46: What is Wide Area Network (WAN)?

Ans: A WAN covers a large geographical area, connecting multiple LANs and MANs. The internet is the largest example of a WAN.

Example: The network that connects different branch offices of a multinational company across countries is a WAN

Q.47: What is Campus Area Network (CAN)?

Ans: A CAN is a network that connects multiple LANs within a limited geographical area, such as a university campus or a business park.

Example: The network that connects various departments and buildings within a university is a CAN.

Q.48: What is Intranet?

Ans: A private network inside a company that uses internet technology (like websites). Only people within the organization can access it.

Q.49: What are Real-World Applications of Computer Networks?

Ans:

➤ **Business:** In business, networks enable efficient communication, resource sharing, and data management.

Example: Companies use intranets to share information and resources securely within the organization.

➤ **Education:** Educational institutions use networks to provide online learning

platforms, virtual classrooms, and access to educational resources.

Example: Universities use Learning Management Systems (LMS) like Blackboard and Moodle to deliver course content and assessments. (*Note: "Moodie" is a typo for "Moodle" in the source document*).

➤ **Healthcare:** Healthcare networks facilitate the sharing of patient information, telemedicine, and access to medical databases.

Example: Hospitals use Electronic Health Records (EHR) systems to store and retrieve patient data efficiently.

Exercise Short Questions:

Q.1: Define data communication.

Ans: Data communication involves the exchange of data between a sender and a receiver through a communication medium. Key components include the sender, receiver, message, protocol, and medium.

Q.2: Enlist its key components of data communications.

Ans: Sender, Receiver, Message, Protocol and Medium.

Q.3: Write the role of routers in a computer network.

Ans: A router is a networking device that interconnects networks or allows devices to connect to it. It directs data packets between different networks. Think of it as a traffic director on the internet, making sure that data gets from one place to another efficiently.

Q.4: What are the main functions of the Network Layer in the OSI model?

Ans: The Network Layer is responsible for data transfer between different networks. It determines the best path for data to travel from the source to the destination.

Q.5: What is the purpose of the Dynamic Host Configuration Protocol (DHCP)?

Ans: DHCP automatically assigns IP addresses to devices on a network, simplifying network management.

Example: When a device connects to a Wi-Fi network, DHCP assigns it an IP address.

Q.6: Differentiate between TCP and UDP.

Ans: TCP/IP (Transmission Control Protocol/Internet Protocol) is the fundamental suite of protocols for internet communication.

➤ **Transmission Control Protocol (TCP):** Ensures reliable data transfer.

- **Internet Protocol (IP):** Handles addressing and routing of data packets.
- **User Datagram Protocol (UDP):** Provides faster, but less reliable, data transfer.

Q.7: Explain the importance of encryption in network security.

Ans: Encryption Protects data by converting it into a secure format.

Q.8: Define star topology?

Ans: In a star topology each node in network communicates with the others via a central switch or hub. The hub works as a data flow repeater.

Q.9: How does firewall contribute to network security?

Ans: Firewalls Monitor and control incoming and outgoing network traffic.

Q.10: What is difference between Half Duplex and Full Duplex communication?

Ans: In Half-Duplex communication, data transmission can occur in both directions, but not simultaneously. One device must wait for the other to finish transmitting before it can start.

Example: walkie-talkies

Full-duplex communication allows for simultaneous data delivery in both directions. Both devices may transmit and receive data simultaneously at the same time.

Example: Telephone conversation is an example of Full-Duplex communication.

Unit: 4

COMPUTATIONAL THINKING

Q.1: Define Computational Thinking?

Ans: Computational Thinking (CT) is a problem-solving process that involves a set of skills and techniques to solve complex problems in a way that it can be executed by a computer.

Q.2: What is Decomposition?

Ans: Decomposition is the method of breaking down a complicated problem into smaller, more convenient components. Decomposition is an important step in computational thinking.

Q.3: What is meant by Pattern Recognition?

Ans: Pattern recognition is an essential aspect of computational thinking. It involves identifying and understanding regularities or patterns within a set of data or problems.

Q.4: Define Abstraction?

Ans: Abstraction is the process of hiding the complex details while exposing only the necessary parts. It helps reduce complexity by allowing us to focus on the high-level overview without getting lost in the details.

Q.5: Define Algorithms?

Ans: An algorithm is a precise sequence of instructions that can be followed to achieve a specific goal.

Q.6: What are the Principles of Computational Thinking?

Ans: Computational thinking involves several key principles that guide the process of problem-solving in a structured manner.

- **Problem Understanding:** Understand a problem involves identifying the core issue, defining the requirements, and setting the objectives.

- **Problem Simplification:** Simplifying a problem involves breaking it down into smaller, more manageable sub-problems.

- **Solution Selection and Design:** Choosing the best solution involves evaluating different approaches and selecting the most efficient one.

Q.7: What are the Algorithm Design Methods?

Ans: Algorithm design methods provide a range of tools and techniques to tackle various computational problems effectively. We will discuss two of these methods: Flowcharts & Pseudocode.

Q.8: Define Flowcharts?

Ans: Flowcharts are visual representations of the steps in a process or system, depicted using different symbols connected by arrows.

Q.9: Where did the Flowcharts used?

Ans: They are widely used in various fields, including computer science, engineering, and business, to model processes, design systems, and communicate complex workflows clearly and effectively.

Q.10: What is the Importance of Flowcharts?

Ans:

- **Clarity:** Flowcharts provide a clear and concise way to represent processes, making them easier to understand at a glance.
- **Communication:** They are excellent tools for communicating complex processes to a wide audience, ensuring everyone has a common understanding.

- **Problem Solving:** Flowcharts help identify bottlenecks and inefficiencies in a process, aiding in problem-solving and optimization.
- **Documentation:** They serve as essential documentation for systems and processes, which is useful for training and reference purposes.

Q.11: What are the Flowchart Symbols?

Ans: Flowchart symbols are visual representations used to illustrate the steps and flow of a process or system as shown in Table.

Name	Description	Symbol
Oval (Terminal)	Represents the start or end of a process.	
Rectangle (Process)	Represents a process, task, or operation that needs to be performed.	
Parallelogram (Input/Output)	Represents data input or output	
Diamond (Decision)	Represents a decision point in the process	
Arrow (Flow line)	Shows the direction of flow within the flowchart	

Q.12: Define Pseudocode?

Ans: Pseudocode is a method of representing an algorithm using simple and informal language that is easy to understand.

Q.13: How Pseudocode works?

Ans: Pseudocode is not actual code that can be run on a computer, but rather a way to describe the steps of an algorithm in a manner that is easy to follow.

Q.14: Why Use Pseudocode?

Ans: Using pseudocode has several benefits:

- **Clarity:** It helps in understanding the logic of the algorithm without worrying about syntax.
- **Planning:** It allows programmers to outline their thoughts and plan the steps of the algorithm.

- **Communication:** It is a universal way to convey the steps of an algorithm, making it easier to discuss with others.

Q.15: Differentiating Flowcharts and Pseudocode?

Ans: Flowcharts and pseudocode are both tools used to describe algorithms, but they do so in different ways.

Pseudocode	Flowcharts
➤ Pseudocode uses plain language and structured format to represent steps.	➤ Flowcharts use graphical symbols and arrows to represent steps and execution flow.
➤ It is read like a story, with each step is written out sequentially.	➤ It is like watching a movie, where each symbol represents a different type of action or decision.
➤ Pseudocode communicates the steps in a detailed, narrative-like format.	➤ Flowchart communicates the process in a visual format, which can be more effective for understanding the overall flow and structure.
➤ It is particularly useful for documenting algorithms in a way that can be easily converted into actual code in any programming language.	➤ They are useful for identifying the steps and decisions in an algorithm at a glance.

Q.16: What are Evaluation Techniques for an Algorithm?

Ans: Techniques to essential algorithms are essential to understand how efficiently they solve problems. Time complexity & Space complexity are two Evaluation Techniques for an Algorithm.

Q.17: What is Time Complexity?

Ans: Time complexity measures how fast or slow an algorithm performs. It shows how the running time of an algorithm changes as the size of the input increases.

Q.18: What is Space Complexity?

Ans: Space complexity measures the amount of memory an algorithm uses relative to input size. It is essential to consider both the memory required for the input and any extra memory used by the algorithm.

Q.19: Define Dry Run?

Ans: A dry run involves manually going through the algorithm with sample data to identify any errors.

Q.20: What is Dry Run of a Flowchart?

Ans: A dry run of a flowchart involves manually walking through the flowchart step-by-step to understand how the algorithm works without using a computer.

Q.21: What is Dry Run of Pseudocode?

Ans: A dry run of pseudocode involves manually simulating the execution of the pseudocode line-by-line.

Q.22: What is Simulation?

Ans: Simulation is the use of computer programs to create a model of a real-world process or system. This helps us understand how things work by testing different ideas or algorithms without needing to try them out in real life.

Q.23: Why Use Simulation?

Ans:

- 1. Testing Algorithms:** an algorithm works with different types of data.
- 2. Exploring Scenarios:** Simulation allows us to create many different situations to see what happens.

Q.24: What are the Benefits of Simulation?

Ans:

- **Cost-Effective:** It is often cheaper and faster to run simulations than to conduct real experiments.
- **Safe:** We can test dangerous situations, like a fire in a building, without putting anyone at risk.
- **Repeatable:** We can run the same simulation multiple times with different settings to observe how things change.

Q.25: Examples of Simulation

Ans:

- 1. Weather Forecasting:** Meteorologists use simulations to predict the weather.
- 2. Traffic Flow:** City planners can simulate traffic to see how changes to roads or traffic lights might affect the flow of cars.

Q.26: What is LARP (Logic of Algorithms for Resolution of Problems)?

Ans: LARP stands for Logic of Algorithms for resolution of Problems. It is a fun and interactive way to learn how algorithms work by actually running them and seeing the results.

Q.27: Why is LARP Important?

Ans: LARP helps you:

- Understand how algorithms work.
- See the effect of different inputs on the output.
- Practice writing and improving your own algorithms.

Q.28: How do we Write Algorithms using LARP?

Ans: Writing algorithms using LARP involves a structured and simplified approach to developing logical solutions for computational problems.

Q.29: How do we Draw Flowcharts in LARP?

Ans: Drawing flowcharts in LARP involves visually representing the algorithm's steps using standard flowchart symbols such as rectangles for processes, diamonds for decisions, and parallelograms for input/output operations.

Q.30: Define Error?

Ans: When we write algorithms or create flowcharts in LARP, we sometimes make mistakes called errors or bugs.

Q.31: What is Error Identification and Debugging?

Ans: Error handling and debugging are processes that help us find and fix these errors.

Q.32: Describe Types of Errors?

Ans: There are three main types of errors you might encounter:

- **Syntax Errors:** These occur when we write something incorrectly in our algorithm or flowchart. For example, missing a step or using the wrong symbol.
- **Runtime Errors:** These happen when the algorithm or flowchart is being executed. For example, trying to perform an impossible operation, such as dividing by zero.
- **Logical Errors:** These are mistakes in the logic of the algorithm that cause it to behave incorrectly. For example, using the wrong condition in a decision step.

Q.33: Which error is hardest to find?

Ans: Logical errors are the hardest to find because the algorithm still runs but does not produce correct answers.

Q.34: Write some Common Error Messages in LARP?

Ans: Here are some common error messages you might see in LARP and what they mean:

- **Missing Step** - You probably forgot to include an important step in your algorithm.
- **Undefined Variable** - You are using a variable that hasn't been defined yet.
- **Invalid Operation** - You are trying to perform an operation that is not allowed, like dividing by zero.

Exercise Short Questions:

Q.1: Define computational thinking.

Ans: Computational Thinking (CT) is a problem-solving process that involves a set of skills and techniques to solve complex problems in a way that it can be executed by a computer.

Q.2: What is decomposition in computational thinking?

Ans: Decomposition is the method of breaking down a complicated problem into smaller, more convenient components. Decomposition is an important step in computational thinking.

Q.3: Describe abstraction in problem-solving.

Ans: Abstraction is the process of hiding the complex details while exposing only the necessary parts. It helps reduce complexity by allowing us to focus on the high-level overview without getting lost in the details.

Q.4: What is an algorithm?

Ans: An algorithm is a precise sequence of instructions that can be followed to achieve a specific goal.

Q.5: How does problem understanding help in computational thinking?

Ans: Problem Understanding involves identifying the core issue, defining the requirements, and setting the objectives.

Q.6: Why we use flow charts?

Ans: Flowcharts provide a clear and concise way to represent processes, making them easier to understand at a glance. Flowcharts help identify bottlenecks and inefficiencies in a process, aiding in problem-solving and optimization.

Q.7: What is purpose of pseudocode?

Ans: Pseudocode is a method of representing an algorithm using simple and informal language that is easy to understand.

Q.8: How do you differentiate between flowcharts and pseudocode?

Ans: Flowcharts and pseudocode are both tools used to describe algorithms, but they do so in different ways.

Pseudocode	Flowcharts
➤ Pseudocode uses plain language and structured format to represent steps.	➤ Flowcharts use graphical symbols and arrows to represent steps and execution flow.
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➤ Pseudocode communicates the steps in a detailed, narrative-like format.	➤ Flowchart communicates the process in a visual format, which can be more effective for understanding the overall flow and structure.
➤ It is particularly useful for documenting algorithms in a way that can be easily converted into actual code in any programming language.	➤ They are useful for identifying the steps and decisions in an algorithm at a glance.

Unit: 5 Web Development with HTML, CSS, and JavaScript

Q.1: What is Web Development?

Ans: Process of creating websites and web applications is called web development. It means using various programming languages and tools to design, build, and maintain websites.

Q.2: Why Learn Web Development?

Ans: Web development is a valuable skill for several reasons:

- **Digital Literacy:** When you learn web development, you find out how websites are made.
- **Career Opportunities:** Opens up a wide range of job prospects in the growing IT industry. Web developers can get many different kinds of jobs.

- **Problem-Solving:** When you build a website, you solve many problems.
- **Creativity:** Allows you to create visually appealing and interactive websites.
- **Entrepreneurship:** With web development skills, you can start your own online business.

Q.3: What are Basic Components of Web Development?

Ans: Web development involves creating websites and web applications. It has three main components: 1. Front-end 2. Back-end 3. Full-Stack Development

Q.4: What is Front-end Development?

Ans: This focuses on what users see and interact with on a website. The following fundamentals are used to design interactive Front-ends: HTML, CSS & JavaScript.

Q.5: What is Back-end Development?

Ans: This manages the behind-the-scenes functionality of a website, including servers, databases, and application logic.

Q.6: What are Web Servers?

Ans: Web servers are computers that store and deliver web pages to users when they enter a URL.

Q.7: Define Databases?

Ans: Databases store and manage data, like user information, product details, and website content.

Q.8: What is Back-end?

Ans: Back end Programming Languages like PHP, Python, and Ruby handle tasks such as processing forms, and managing user logins.

Q.9: What is Full-Stack Development?

Ans: In the case of login system, a full-stack developer will create the User Interface (UI) for front-end and handle user authentication and database interaction for back-end.

Q.10: What is HTML?

Ans: HTML is the standard language used to create web pages. Think of HTML as the building blocks of a website.

Q.11: Define Text Editor?

Ans: This is where you write your HTML code. Popular text editors include Notepad++, Sublime Text, and Visual Studio Code.

Q.12: Define Web Browser?

Ans: You will use this to view and test your HTML files. Common web browsers are Google Chrome, Mozilla Firefox, and Microsoft Edge.

Q.13: How do we create a basic HTML Application?

Ans: To create a basic HTML application, follow these simple steps:

1. Open your text editor.
2. Write the following HTML code.
3. Save your file with an .html extension.

Q.14: How do we View the HTML File?

Ans:

1. Open your Web browser.
2. Double-click on your file.
3. You should see the text displayed on the web page.

Q.15: What are the HTML Basic Structure?

Ans: A structured HTML document is easier to read and understand. Every HTML document has a basic structure where:

- **<!DOCTYPE html>:** This line tells the browser that this is an HTML5 document.
- **<html>:** This is the root element of an HTML page.
- **<head>:** This section contains meta-information about the HTML document, like the title.
- **<title>:** This sets the title of the web page, which appears in the browser tab.
- **<body>:** This section contains the content of the web page that you see in the browser.
- **<h1>:** This defines a large heading.
- **<p>:** This defines a paragraph.

Q.16: What is HTML Tags?

Ans: Elements that make up an HTML document are called tags. On the basis of structure, HTML Tags are categorized into two types:

1. **Paired Tags:** Comes in pairs an opening Tag and closing Tag i.e <p>.....</p>.
2. **Singular Tags:** Do not need closing Tags. They are also known as self-closing Tags i.e., ,
.

Q.17: What is Creating Content in HTML?

Ans: Content in HTML is the main information on a web page that users read and interact with. It includes text, images, videos, links, and other elements that convey the purpose and message of the page.

Q.18: Define Headings?

Ans: Headings in HTML, ranging from <h1> to <h6>, are used to define the structure and hierarchy of content on a web page.

Q.19: What are the Importance of Headings?

Ans:

1. **Organizing Content:** Headings help organize the content into sections and subsections,

making it easier for users to read and understand.

2. Search Engine Optimization (SEO): Search engines use headings to understand the structure and main topics of a web page. Proper use of headings can improve the pages SEO, helping it rank higher in search results.

3. Consistent Formatting: Using standard heading tags ensures consistent formatting across different browsers and devices.

Q.20: What is Paragraphs Tag?

Ans: Paragraphs in HTML are used to organize and separate text into readable sections. Paragraphs starts with the <p> tag and it ends with </p>

Q.21: What is Links Tag?

Ans: Links in HTML are used to connect one web page to another. Links are created using the <a> tag.
Visit Example.com

Q.22: What is Images Tag?

Ans: Images are important in HTML because they make web pages more attractive and engaging. Images are added using the tag.

Q.23: Define Lists?

Ans: Lists improve readability by breaking complex ideas into simpler parts, allowing users to scan for details easily. Overall, lists make the content more organized and accessible for everyone.

Q.24: What is Unordered List?

Ans: Unordered list used to group related items where the specific order or sequence does not matter. tag used for that list.

Q.25: What is Ordered List?

Ans: Ordered list used to group related items where the specific order or sequence does matter. tag used for that list.

Q.26: How do we Create Tables in HTML?

Ans: Tables in HTML are used to display data in a structured format, allowing for easy comparison and organization of information. A table is created using the <table> tag.

- Table contains rows defined by <tr> (table row) tags, and each row consists of cells represented by <td> (table data) tags.
- Additionally, headings for the table can be added using <th> (table header) tags to provide context for the data.

Q.27: What are HTML Comments?

Ans: In HTML, comments can be extremely useful for:

- Explaining the purpose of a specific section of code
- Leaving reminders for future edits
- Temporarily disabling code for testing purposes

Q.28: What is the Syntax of HTML Comments?

Ans: HTML comments begin with <!-- and end with -->. Any text placed within these markers will be treated as a comment and will not be rendered by the browser.

- <!-- This is a comment -->

Q.29: What is Styling with CSS?

Ans: Styling with Cascading Style Sheets (CSS) is very important for improving the visual appearance of webpages and improving user experience. CSS allows web developers to control the colors, fonts, layout, and overall design of HTML elements, separating the content from the presentation.

Q.30: What are the Basic Structure of CSS?

Ans: The basic structure of CSS is essential for applying styles to HTML elements effectively. CSS is composed of rules that consist of selectors and declarations.

- **Selectors** specify which HTML elements the styles will apply to.
- **Declarations** define the specific styles to be applied, including properties and their corresponding values.

Q.31: How do we Integrate CSS in HTML?

Ans: Integrating CSS with HTML is essential for styling web pages and it can be done in three primary ways: inline, internal, and external styles.

Q.32: What is Inline Styles?

Ans: In this method involves adding CSS directly to individual HTML elements using the style attribute.

Q.33: What is Internal Styles?

Ans: CSS can also be included in the <head> section of an HTML document using the <style> tag. This method allows you to define styles for the entire page without affecting others.

Q.34: What is External Styles?

Ans: The most efficient method for larger projects is to use an external CSS file, which is linked to the HTML document with the <link> tag in the <head> section. This keeps the HTML clean and allows for easy updates across multiple pages.

Q.35: How can we Create Layouts and Organizing Content on web pages?

Ans: Creating layouts and organizing content on a web page is an important part of web design. CSS

helps you arrange different parts of your web page in an organized way. Here are some basic methods to create layouts and organize content: Divs and Sections, CSS Grid, CSS Flexbox.

Q.36: What is Divs and Sections?

Ans: HTML elements like <div> and <section> are used to group content together. You can then use CSS to style and position them.

Q.37: What is CSS Grid?

Ans: The CSS Grid Layout is a powerful tool for creating complex layouts. It allows you to arrange items into rows and columns.

Q.38: What is CSS Flexbox?

Ans: Flexbox is another layout tool that helps in arranging items in a flexible and responsive way. It is useful for aligning items in a row or column.

Q.39: What is JavaScript?

Ans: JavaScript is a programming language that is used to make websites interactive and engaging. It allows developers to create things like animations, games, and responsive features that react when you click buttons or move your mouse.

Q.40: What is meant by Variables and Data Types in JavaScript?

Ans: In JavaScript, you can store data using variables. A variable is like a container that holds information which can be used and manipulated in your code.

Q.41: How we Declare Variables in JavaScript?

Ans: To declare a variable in JavaScript, you use the var, let, or const keyword.

Q.42: What are Functions in JavaScript?

Ans: Functions allow you to reuse code and perform specific tasks. They are like mini programs that you can run whenever you need them.

Q.43: What is meant by Function with Parameters?

Ans: Sometimes, you want your function to do something with input values. You can achieve this using parameters. You can also create functions that take multiple parameters.

Exercise Short Questions:

Q.1: What is the purpose of the <head> tag in HTML?

Ans: This section contains meta-information about the HTML document, like the title.

Q.2: Explain the difference b/w an ordered list and an unordered list in HTML.

Ans: Unordered list used to group related items where the specific order or sequence does not matter. tag used for that list.
Ordered list used to group related items where the specific order or sequence does matter. tag used for that list.

Q.3: How do you add a comment in HTML?

Ans: HTML comments begin with <!-- and end with -->. Any text placed within these markers will be treated as a comment and will not be rendered by the browser.
<!-- This is a comment -->

Q.4: What are the different ways to apply CSS to an HTML document?

Ans: Integrating CSS with HTML is essential for styling web pages and it can be done in three primary ways: inline, internal, and external styles.

Q.5: How can you include JavaScript in an HTML file?

Ans: There are various ways to include JavaScript in an HTML file. One option is to use inline JavaScript, which embeds JavaScript directly into the event properties of an HTML element. Such as onclick or onload.

Q.6: Describe the syntax for creating a hyperlink in HTML.

Ans: Links in HTML are used to connect one web page to another. Links are created using the <a> tag.
Visit Example.com

Q.7: What is the function of the <div> tag in HTML?

Ans: HTML elements like <div> and <section> are used to group content together. You can then use CSS to style and position them.

Q.8: What is the use of the <table> tag in HTML?

Ans: Tables in HTML are used to display data in a structured format, allowing for easy comparison and organization of information.

Q.9: Explain the box model in CSS.

Ans: Flexbox is another layout tool that helps in arranging items in a flexible and responsive way. It is useful for aligning items in a row or column.

Unit: 6 Web Development with HTML, CSS, and JavaScript

Q.1: What is Data?

Ans: Data consists of raw facts collected about things. Data can take many forms, such as numbers, images and sounds etc.

Q.2: What is Information?

Ans: We can process data to generate useful information.

Q.3: What are Data Types?

Ans: Data can be divided into two broad categories namely qualitative and quantitative.

Q.4: What is Qualitative Data?

Ans: Qualitative data refer to categories or labels used to describe the qualities or characteristics of something rather than its quantity.

Q.5: What are the characteristics of qualitative data?

Ans: Key characteristics of qualitative data include non-numeric and categorical attributes.

Q.6: What is Non-Numeric characteristic qualitative data?

Ans: Qualitative data is represented by words, labels, or symbols instead of numbers. Examples include the names of students in a class (e.g., Ali, Badar, and Qasim).

Q.7: What is Categorical characteristic qualitative data?

Ans: Qualitative data can be divided into categories or classes based on their characteristics. Examples include types of fruit.

Q.8: What is Quantitative Data?

Ans: Quantitative data consists of numbers used to measure the quantity or amount of something. These data types useful for mathematical calculations and statistical analyses.

Q.9: What are the characteristics of quantitative data?

Ans: Key characteristics of quantitative data include being numerical, measurable, countable, and arithmetical.

Q.10: What is Numerical characteristic qualitative data?

Ans: Quantitative data is expressed in numbers, representing a measurable quantity. **Examples** include heights, weights and test scores.

Q.11: What is Measurable characteristic quantitative data?

Ans: Quantitative data can be measured using instruments or tools. **Examples** include using a ruler for length and a thermometer for temperature.

Q.12: What is Countable characteristic quantitative data?

Ans: Quantitative data can be counted or enumerated, particularly for discrete data. **Examples** include the number of students the number of cars.

Q.13: What is Arithmetical characteristic quantitative data?

Ans: Quantitative data can be used in arithmetic operations. **For Example**, multiplying the unit

price of a fruit by its weight to find the total price.

Q.14: What is meant by Organizing and Analyzing Data?

Ans: Organizing data systematically is very important for clear analysis and interpretation. When data is well-organized, it helps reduce errors. Organizing the data neatly in a table reduces such mistakes.

Q.15: What are the Importance of Organizing Data?

Ans:

- Proper organization saves time. When data is organized, it's easier to find and analyze.
- Organized data improves clarity. When data is presented clearly, it's easier to understand and interpret.
- By organizing data into tables, charts, and graphs, you can quickly grasp what the data is saying.

Q.16: What are Data Tables?

Ans: Tables helps to data clarity, making it easy to compare and analyze it.

Q.17: What is Chart?

Ans: Charts are visuals representation of data designed to make complex information easier to understand.

Q.18: What are the types of Charts?

Ans: Common types of charts include:

- Bar charts
- Line charts
- Pie charts.

Q.19: What is Graphs?

Ans: Graphs are visual tools used to represent data and show relationship between different data points.

Q.20: What are the types of graphs?

Ans: Common types of graphs include:

- Line graphs
- Bar graphs
- Scatter plots
- Histograms etc.

Q.21: What is Data collection?

Ans: The process of gathering information to answer questions, make decisions, or understand something better.

Q.22: What are the Methods of Data Collection?

Ans: Here's a simple explanation of the main methods:

Surveys: Surveys collect information from people by asking them questions. This can be done on paper, over the phone, or online.

Q.23: What is the Best Practices in Survey Design and Administration?

Ans:

- Be clear and specific Keep it short and simple
- Use multiple choice and rating scales Ensure anonymity
- Test your survey before sending it out Analyze the results

Q.24: What are the Data Types according to storage and process?

Ans: With respect to storage and processing, data has two types: structured and unstructured data.

Q.25: What is Structured Data?

Ans: Structured data is organized and formatted to be easily searchable and analyzable.

Q.26: What is Unstructured Data?

Ans: Unstructured data is more free-form and doesn't fit into a specific format.

Q.27: What is Data Visualization?

Ans: Data visualization is the process of turning numbers and information into pictures. These pictures make it easier for us to understand what the data is telling us.

Q.28: What are the Data Visualization Tools?

Ans:

- **Microsoft Excel:** A spreadsheet tool that can create various charts and graphs.
- **Google Sheets:** Similar to Excel, it allows you to create and share visualizations online.
- **Tableau:** A powerful tool specifically designed for creating detailed and interactive visualizations.
- **Microsoft Power BI:** Power BI allows users to create a wide variety of visualizations, including charts, graphs, maps, and more, to represent data in an intuitive and understandable format.

Q.29: What is Data Pre-processing?

Ans: Data pre-processing is the first and most important step in working with data. It involves getting the data ready for analysis by cleaning and organizing it.

Q.30: What are the Data Pre-processing Techniques?

Ans:

- i) **Evaluating Data Quality:** Before using data, we need to check its quality, ensuring it is accurate, complete, and reliable.
- ii) **Identifying Errors, Outliers, and Biases:**

Errors are mistakes in the data.

Outliers are unusual or extreme values that don't fit the pattern of the rest of the data.

Biases are distortions that affect the accuracy of the data.

Q.31: What is Data Validation?

Ans: Involves checking data completeness and accuracy. Completeness means to ensure that no data is missing. Accuracy ensures the data is correct.

Q.32: What is Data Cleaning?

Ans: It involves error removing, handling missing data and dealing with outliers. Errors are either corrected or the incorrect data is deleted.

Q.33: What are the Data Analysis Techniques?

Ans: Data analysis involves examining data to discover useful information, draw conclusions, and support decision-making. There are two main types of data analysis: quantitative and qualitative.

Q.34: What is Quantitative Analysis?

Ans: Quantitative analysis deals with numbers and measurable data. It helps us understand patterns, relationships, and trends in numeric data.

Q.35: What is Qualitative Analysis?

Ans: Qualitative analysis deals with non-numeric data such as text, images, and sounds. It helps us understand meanings, concepts, and experiences.

Q.36: What is Cloud Storage and Data Backups?

Ans: In today's world, working together and sharing information online is essential. Collaborative tools make this possible, allowing people to work together, share files, and access their work from anywhere.

Q.37: What is Cloud Storage for Data Management?

Ans: Using cloud storage for managing data has become an essential part of how we store, access, and share information. It allows us to save files on the internet for access from any device.

Q.38: What is Remote Access?

Ans: Remote access refers to the ability to connect to and use a computer or network from a distant location. You can work on files, use software, or access resources on a computer or network that is not physically near you.

Q.39: What is Data Backups?

Ans: Data Backups are copies of important data or files stored separately from the original to protect against data loss.

Q.40: What are the Benefits of Collaborative Tools?

Ans:

1. Enhanced Productivity: This saves time and allows everyone to contribute their best work.

2. Version Control: You don't lose work, and you can see who made which changes in the document.

Q.41: What is Data Science?

Ans: Data science is like being a detective, but instead of solving crimes, you solve problems using data.

Q.42: Why to understand Data Science?

Ans: Knowing about data science is important because it helps us make better decisions in our daily lives.

Q.43: What are the Interdisciplinary Nature of Data Science?

Ans:

- **Computer Science:** For handling and organizing data.
- **Mathematics and Statistics:** For analyzing data and finding patterns.
- **Business Knowledge:** For applying these insights to real-life problems and making informed decisions.

Q.44: What are the Tools in Data Science?

Ans:

- **Microsoft Excel:** Excel is a widely-used spreadsheet program that helps you organize and analyze data.
- **Python:** Python is a popular programming language used in data science for analyzing data and building data models.
- **R:** R is another programming language designed for statistical analysis and data visualization. It is particularly good at handling complex data and presenting it in a clear way.
- **SQL:** SQL (Structured Query Language) is used to manage and query databases. SQL allows you to extract this specific information quickly.

Exercise Short Questions:

Q.1: Write two differences between qualitative and quantitative data?

Ans: Qualitative data refer to categories or labels used to describe the qualities or characteristics of something rather than its quantity.

Quantitative data consists of numbers used to measure the quantity or amount of something. These data types useful for mathematical calculations and statistical analyses.

Q.2: Which method would you use to collect opinions from a large group of people about a new school policy?

Ans: We will use surveys method to collect opinions from a large group of people about a new school policy. Surveys collect information from people by asking them questions. This can be done on paper, over the phone, or online.

Q.3: What type of data is the number of students in your class?

Ans: The number of students in your class is quantitative (numerical) data, because it represents a countable quantity.

Q.4: Why is it important to organize data into tables or charts before analyzing it?

Ans: By organizing data into tables, charts, and graphs, you can quickly grasp what the data is saying. Organized data improves clarity. When data is presented clearly, it's easier to understand and interpret.

Q.5: Explain why data visualization is important.

Ans: Because data visualization is the process of turning numbers and information into pictures. These pictures make it easier for us to understand what the data is telling us.

Q.6: For which purpose do we use line graph?

Ans: It is a type of graph that represent data in graphical format, making the raw data more understandable.

Q.7: How does Microsoft Power BI help in data visualization?

Ans: Power BI allows users to create a wide variety of visualizations, including charts, graphs, maps, and more, to represent data in an intuitive and understandable format.

Q.8: How can we use Python in Data Science?

Ans: Python is a popular programming language used in data science for analyzing data and building data models.

Q.9: What is SQL?

Ans: SQL (Structured Query Language) is used to manage and query databases. SQL allows you to extract this specific information quickly.

Unit: 7 EMERGING TECHNOLOGIES IN COMPUTER SCIENCE

Q.1: Define the Artificial Intelligence (AI)?

Ans: Artificial Intelligence is a rapidly growing field that is transforming various aspects of our lives.

Artificial Intelligence denotes the simulation of human thinking ability in computer systems to think and learn in a manner like humans.

Q.2: Write down the applications of AI in Various Domains?

Ans: AI has numerous applications across different fields:

- **Healthcare:** AI is used for diagnosing diseases, personalizing treatment plans, and predicting patient outcomes.
- **Education:** AI-powered tools provide personalized learning experiences, automate administrative tasks, and offer insights into student performance.
- **Gaming:** AI enhances game design, creates realistic characters, and improves player experiences.
- **Transportation:** Self-driving cars and traffic management systems rely on AI to improve safety and efficiency.
- **Automobile:** AI is transforming the automotive industry by enabling autonomous driving, advanced driver assistance, and optimization of vehicle performance and maintenance.
- **Finance:** AI is transforming the finance industry by enabling personalized investment recommendations, fraud detection and many more.
- **Social media:** AI is extensively used in social media to power personalized content recommendations, automated content generation etc.
- **Agriculture:** AI is transforming agriculture by enabling precision farming techniques, such as predictive analytics for crop yields etc.
- **E-Commerce:** AI is highly integrated into e-commerce platforms, powering personalized product recommendations, and intelligent chat bots for customer support, fraud detection systems, and others.

Q.3: Write down the Subfields of AI?

Ans: AI encompasses several subfields, each focusing on different aspects of intelligence and technology:

- **Machine Learning:** Machine learning is a type of artificial intelligence where computers learn from experience and improve over time without being explicitly programmed.

- **Deep Learning:** Deep learning is a special kind of machine learning. It uses complex structures called neural networks, which are inspired by how our brains work.
- **Natural Language Processing (NLP):** Natural Language Processing, or NLP, is a technology that helps computers understand and talk to us in our language.
- **Computer Vision:** Computer vision is a field of artificial intelligence that enables computers to see and understand the visual world.
- **Robotics:** Robotics is the science of building and programming robots. Robots are machines that can do tasks for us, like cleaning the floor or building cars.

Q.4: What are the AI Algorithms and Techniques?

Ans: Artificial Intelligence (AI) involves using algorithms and techniques to enable machines to perform tasks that typically require human intelligence.

Q.5: Write down the types of AI Algorithms?

Ans: AI algorithms can be broadly categorized into two types based on their interpretability:

(i) **Explainable (white box)** algorithms

(ii) **Unexplainable (black box)** algorithms

Q.6: What is Explainable (White box) Algorithms?

Ans: Explainable or white box algorithms are those where the decision-making process is transparent and understandable. These algorithms allow users to see and understand how decisions are made.

Q.7: What is Unexplainable (Black box) Algorithms?

Ans: Unexplainable or black box algorithms are those where the decision-making process is not easily interpretable. These algorithms often involve complex computations and interactions that make it difficult to understand how a particular decision was reached.

Q.8: Why to understand IoT?

Ans: IoT is a revolutionary concept that is transforming the way we live and work. It involves connecting everyday devices and systems to the internet, allowing them to communicate and interact with each other.

Q.9: Define IOT?

Ans: IoT is a network of physical objects, or "things," that are equipped with sensors, software, and other technologies to facilitate the exchange of data with other devices and systems over the internet.

Q.10: What is the Significance of IoT?

Ans: IoT is significant because it allows for the seamless integration of the physical and digital worlds. This connection enables devices to collect and share data, which can be analyzed to improve efficiency.

Q.11: What are the Components of IoT Systems?

Ans: An IoT system typically consists of the following components:

- **Sensors:** These are devices that detect and measure physical properties like temperature, humidity, light, and motion. Sensors collect data from the environment.
- **Actuators:** These are devices that convert energy into motion.
- **Devices:** These include everyday objects like smartwatches, refrigerators, and cars that are connected to the internet.
- **Networks:** These are the communication pathways that connect sensors and devices to the internet, allowing them to share data. Networks can be wired or wireless.
- **Data Analysis:** This involves processing and analysing the data collected by sensors to gain insights and make decisions.

Q.12: What are the IoT Applications?

Ans:

- **Healthcare:** IoT is revolutionising healthcare by providing better patient monitoring and care.
- **Transportation:** IoT is enhancing transportation systems, making them more efficient and safer.

Q.13: What is Security and Privacy Considerations in IoT Deployments?

Ans: While IoT offers many benefits, it also raises security and privacy concerns. As more devices are connected to the internet, the risk of cyber-attacks increases. It's important to ensure that IoT systems are secure to protect personal data and privacy.

Q.14: What are the Examples of Security Measures?

Ans:

- **Strong Passwords:** Use strong, unique passwords for all IoT devices to prevent unauthorized access.
- **Regular Updates:** Keep the software and firmware of your IoT devices up to date to protect against known vulnerabilities.
- **Encryption:** Ensure that data transmitted between devices is encrypted to protect it from being intercepted by hackers.

Exercise Short Questions:

Q.1: Define Artificial Intelligence (AI).

Ans: Artificial Intelligence is a rapidly growing field that is transforming various aspects of our lives. Artificial Intelligence denotes the simulation of human thinking ability in computer systems to think and learn in a manner like humans.

Q.2: Provide two examples of AI applications in healthcare.

Ans: AI is used for diagnosing diseases, personalizing treatment plans, and predicting patient outcomes.

Q.3: Explain the role of AI techniques in advancing machine learning models.

Ans: Machine learning is a type of artificial intelligence where computers learn from experience and improve over time without being explicitly programmed.

Q.4: Define the Internet of Things (IoT).

Ans: IoT is a network of physical objects, or "things," that are equipped with sensors, software, and other technologies to facilitate the exchange of data with other devices and systems over the internet.

Q.5: Describe the significance of IoT in connecting devices and systems.

Ans: IOT enables seamless communication between devices and systems, which improves efficiency, data-driven decision making, and applications in various fields such as agriculture and healthcare.

Q.6: Describe applications of IoT in Transportation Domain.

Ans: IoT is enhancing transportation systems, making them more efficient and safer.

Unit: 8 ETHICAL, SOCIAL, & LEGAL CONCERNS IN COMPUTER USAGE

Q.1: What does mean by Secure Computer Usage?

Ans: Computers have become a crucial part of our everyday lives. Safe and responsible computer usage means knowing how to protect our personal information, making wise choices about the hardware and software we use, and

ensuring that our online behavior is respectful and ethical.

Q.2: What is Responsible Computer Usage?

Ans: Being responsible with technology means making thoughtful decisions when using computers. This includes selecting the right

hardware and software, safeguarding our data, and using the internet in a way that respects others.

- **Safety:** Just as you wouldn't use a broken or unsafe tool, using outdated or insecure hardware or software can put you at risk.
- **Efficiency:** The right hardware and software help you complete tasks quickly and easily.
- **Compatibility:** This means that the hardware and software should work well together.

Q.3: What is the Use of Secure Digital Platforms?

Ans: Using digital platforms securely means taking extra steps to protect your information and ensuring that your online activities do not put you or others at risk.

Q.4: What are the tips while using of Digital Platforms?

Ans:

1. Using Strong Passwords: Always create strong, unique passwords for your accounts. A strong password typically includes a mix of letters, numbers, and special characters.

2. Two-Factor Authentication (2FA): Two-Factor Authentication adds an extra layer of security to your accounts. After entering your password, you will be asked to provide another piece of information, like a code sent to your phone.

3. Avoiding Public Wi-Fi for Sensitive Transactions: Public Wi-Fi networks are often less secure. It's best to avoid accessing sensitive information, such as online banking.

4. Being Aware of Scams: Online scams are designed to trick you into giving away your personal information.

5. Regularly Reviewing Your Account Activity: Periodically check your online accounts for any unusual activity. This includes looking at your recent logins, messages, and transactions.

6. Backing Up Important Data: Regularly backing up your data ensures that you won't lose important information if something goes wrong with your device.

Q.5: What are the Best Practices in Online Behavior?

Ans: Using digital platforms like social media, email, cloud services, and online applications has become a part of our daily lives. However, it's important to use these tools responsibly to ensure our safety and the safety of others.

- **Social Media:** Social media platforms allow us to connect with friends and share information. But it's important to think

before you post. Always avoid sharing personal information publicly.

- **Email:** It's important to be careful when opening emails from unknown senders. These could contain harmful links or attachments.
- **Cloud Services:** Cloud services like Google Drive or Dropbox allow you to store and share files online. While these services are convenient, it's important to use them wisely.
- **Online Applications:** Online applications are fun and useful but can also pose risks. Make sure to download apps only from trusted sources to avoid downloading harmful software.

Q.6: What is Copyright?

Ans: Copyright is a legal right that gives creators control over their original works, such as music, books, movies, and software.

Q.7: What is Trademarks?

Ans: Trademarks are symbols, names, or slogans used by companies to distinguish their products or services from others.

Q.8: What is Patents?

Ans: Patents protect new inventions or processes, giving the inventor exclusive rights to make, use, or sell the invention for a certain period.

Q.9: What is Ethical and Legal Responsibilities Regarding Intellectual Property Rights?

Ans: Respecting intellectual property rights means understanding that copying, sharing, or using someone else's work without permission is not only unethical but also illegal.

Q.10: What is Software piracy?

Ans: Software piracy is the illegal copying, distribution, or use of software. When you buy software, you are actually buying a license to use it, not the software itself.

Q.11: What are the Social Networking Safety and Online Interactions Ways?

Ans:

- **Adjust Your Privacy Settings:** Make sure your social media accounts are set to private, so only people you trust can see your posts.
- **Practice Good Online Etiquette:** Be respectful in your online interactions. This means using polite language, avoiding arguments, and not spreading rumors or false information.

- **Practice Respectful Interactions:** Always treat others with respect online, just as you would in person. Avoid making negative comments, and think about how your words might affect someone else.

Q.12: What is Cyberbullying and Harassment?

Ans: Cyberbullying and online harassment are serious issues that can hurt people emotionally and mentally.

Q.13: How to deal with Cyberbullying?

Ans:

- **Recognize Cyberbullying:** Cyberbullying involves using the Internet to harm or harass others. This can include sending mean messages, spreading rumors, or posting embarrassing photos of someone without their permission.
- **Report and Block:** If you experience or witness cyberbullying, report it to the platform and block the person responsible.
- **Support Others:** If you see someone being bullied online, offer your support. You can stand up for them by reporting the bullying or simply offering kind words.

Exercise Short Questions:

Q.1: What is the importance of using computers safely and responsibly?

Ans: Safe and responsible computer use means choosing how to protect personal information, the hardware and software being used, and ensuring that online computer is respectful and ethical.

Q.2: Why should you create strong, unique passwords for your accounts?

Ans: Strong and unique passwords should always be used for accounts as it makes it very difficult for someone to guess the password and gain access to the accounts.

Q.3: How can you protect yourself from harmful links and downloads?

Ans: Avoid clicking on unknown links or downloading files from non-trusted sources. Always use Trusted Source for downloading and links.

Q.4: What is Two-Factor Authentication (2FA), and why is it useful?

Ans: Two-Factor Authentication adds an extra layer of security to your accounts. After entering your password, you will be asked to provide another piece of information, like a code sent to your phone.

Q.5: Why is it a good idea to avoid using public Wi-Fi for sensitive transactions?

Ans: Public Wi-Fi networks are often less secure. It's best to avoid accessing sensitive information, such as online banking.

Q.6: Why is it important to be careful about what you share on social media?

Ans: Because misinformation can mislead people and cause confusion.

Q.7: What is the purpose of privacy laws regarding your personal information?

Ans: The purpose is to protect your personal information from misuse, such as unauthorized access, sharing etc.

Q.8: What is software piracy, and why is it harmful?

Ans: Software piracy is the illegal copying, distribution, or use of software. Piracy is harmful...because it cheats software developers out of the money they need to continue creating and improving their products.

Unit: 9 ENTREPRENEURSHIP IN DIGITAL AGE

Q.1: Define Entrepreneurship?

Ans: Entrepreneurship is the process of starting a new business or organization. It involves identifying a need in the market, coming up with an idea to meet that need, and taking the risk to bring that idea to life.

Q.2: Define Entrepreneurs?

Ans: Entrepreneurs are people who create and run these businesses. They are innovators, risk-takers, and problem solvers.

Q.3: What are the Examples of Entrepreneurship?

Ans:

- **Tech Startups:** Tech startups like Facebook, Google, and Apple began as small companies founded by entrepreneurs who had innovative ideas for new technology.

- **Local Businesses:** Local businesses, such as your neighborhood bakery or a small clothing boutique, are also examples of entrepreneurship.

Q.4: What are the Key Characteristics of Entrepreneurs?

Ans:

- **Innovation:** Innovation means creating something new or improving something that

already exists. Entrepreneurs are always looking for new ways to solve problems or make things better.

- **Risk-Taking:** Starting a new business involves risk. Entrepreneurs must be willing to take chances, knowing that they might fail. However, they also know that taking risks can lead to great rewards.

Q.5: Why is Entrepreneurship Important?

Ans: Entrepreneurship is important because it drives economic growth, creates jobs, and fosters innovation.

Q.6: What is Economic Growth?

Ans: Economic growth means that a country is producing more goods and services, which makes people's lives better. Entrepreneurship plays a big role in this.

Q.7: What is Innovation and Progress?

Ans: Entrepreneurs often come up with groundbreaking ideas that change the way we live and work.

Q.8: Entrepreneurship in the Digital Landscape:

Ans: The digital landscape has revolutionized the way entrepreneurs start and grow their businesses.

Q.9: What is Digital Transformation and Entrepreneurship?

Ans: Digital entrepreneurship involves leveraging the power of the Internet, digital platforms, and various technologies to create and run businesses.

Q.10: What are the Role of Digital Technologies?

Ans: Digital technologies provide entrepreneurs with tools and platforms that can enhance their business operations, reach a global audience, and improve efficiency.

- **Social Media:** Social media platforms such as Facebook, Instagram, and Twitter allow entrepreneurs to market their products, engage with customers, and build a brand presence.
- **Mobile Apps:** Mobile apps enable businesses to offer services directly to customers' smartphones, providing convenience and enhancing user experience.
- **Cloud Computing:** Cloud computing allows businesses to store data and run applications over the Internet, reducing the need for physical infrastructure and enabling remote work.
- **Big Data Analytics:** Big data analytics helps businesses understand market trends,

customer behavior, and make informed decisions based on data insights.

Q.11: What is Digital Marketing and E-commerce?

Ans: Digital marketing and e-commerce have revolutionized the way businesses reach and sell products and services to customers. Digital marketing involves promoting products and services using digital channels, while e-commerce refers to buying and selling goods online.

Q.12: What are Digital Marketing Strategies?

Ans: Digital marketing strategies involve promoting your business online through various channels such as social media, search engines, and email marketing.

- **Search Engine Optimization (SEO):** Optimizing website content to rank higher in search engine results, increasing visibility and traffic.
- **Social Media Marketing:** Using social media platforms to promote products, engage with customers, and build brand awareness.
- **Content Marketing:** Creating valuable content to attract and retain customers, such as blogs, videos, and infographics.
- **Email Marketing:** Sending targeted emails to potential and existing customers to promote products and build relationships.

Q.13: What is E-commerce Platforms?

Ans: E-commerce platforms enable businesses to sell products and services online.

Q.14: What is setting up and managing online stores, payment gateways, and customer service?

- Ans:**
- **Shopify:** Creates and manages online stores with ease.
 - **PayPal:** Integrates payment gateways for secure transactions.
 - **Zendesk:** Provides customer service solutions for handling inquiries and support.

Q.15: What is Business Idea Generation?

Ans: Generating business ideas is an important step in the entrepreneurial journey.

Problem Identification: Identifying market needs and opportunities is the first step in generating a viable business idea.

Q.16: What are Techniques for Identifying Market Needs?

- Ans:**
- **Surveys and Questionnaires:** Collecting feedback directly from potential customers.

- **Market Research:** Analyzing market trends and consumer behavior.
- **Observation:** Watching how people interact with existing products and services.

Q.17: What is Creative Problem Solving?

Ans: Creative problem-solving involves using innovative thinking to develop solutions to identified problems.

Q.18: What are the Creative Problem Solving methods?

Ans: This can be done through various methods, including design thinking and brainstorming.

Applying Design Thinking: Design thinking is a solution-focused approach that involves:

1. **Empathizing:** Understanding the needs of those you're designing for.
2. **Defining:** Clearly stating the problem to solve.
3. **Ideating:** Generating a range of ideas.
4. **Prototyping:** Creating simple models of solutions.
5. **Testing:** Trying out prototypes and gathering feedback.

Q.19: What is Developing Business Plans?

Ans: Developing a business plan is essential for any entrepreneur. A well-crafted business plan provides a roadmap for success, helping to clarify ideas, identify potential challenges, and outline strategies for growth.

Q.20: What is Creating Comprehensive Business Plans?

Ans: A business plan is a detailed document that outlines your business goals and the strategies you will use to achieve them.

Q.21: What are Components of a Business Plan?

Ans: A comprehensive business plan typically includes several key components:

- **Market Analysis:** Market analysis involves researching your target market to understand the needs and preferences of your potential customers.
- **Revenue Models:** A revenue model outlines how your business will generate income.

Q.22: What is Prototyping and Iteration?

Ans: Prototyping involves creating a preliminary model of your product or service to test and refine your business idea.

Building Prototypes: Prototypes can be simple sketches, digital models, or even physical samples.

Q.23: What is Ethical and Sustainable Entrepreneurship?

Ans: Entrepreneurship isn't just about making profits; it is also about conducting business in a way that is ethical and sustainable.

Q.24: What is Ethical Practices?

Ans: Ethical practices in business ensure that a company operates in a way that is fair, transparent, and beneficial to all stakeholders, including customers, employees, and the community.

Q.25: What is Sustainable Growth?

Ans: Sustainable growth focuses on developing a business that meets present needs without compromising the ability of future generations to meet their own needs.

Q.26: What is Ethical Entrepreneurship?

Ans: Ethical entrepreneurship involves incorporating principles of ethics into all aspects of business operations and decision-making. This includes honesty, integrity, fairness, and respect for people and the environment.

Q.27: What are Principles of Ethics in Business?

Ans:

- **Honesty:** Being truthful in all business dealings. *(Text cuts off here at the bottom of the page)*
- **Integrity:** Acting consistently with moral values.
- **Fairness:** Ensuring equal opportunities and fair treatment.
- **Respect:** Valuing the rights and dignity of all individuals.

Q.28: What is Sustainable Development Goals (SDGs)?

Ans: The Sustainable Development Goals (SDGs) are a set of 17 global goals established by the United Nations to address various social, economic, and environmental challenges.

Q.29: How can Aligning Business Goals with SDGs?

Ans:

- **Social Sustainability:** Ensuring fair labor practices, promoting education, and supporting community development.
- **Environmental Sustainability:** Reducing carbon footprints, using renewable resources, and minimizing waste.
- **Economic Sustainability:** Creating jobs, fostering innovation, and contributing to economic growth.

Exercise Short Questions:

Q.1: What is the meaning of the word entrepreneur?

Ans: Entrepreneurs are people who create and run these businesses. They are innovators, risk-takers, and problem solvers.

Q.2: How do digital technologies help entrepreneurs reach a global audience?

Ans: Digital technologies provide entrepreneurs with tools and platforms that can enhance their business operations, reach a global audience, and improve efficiency.

Q.3: What is an e-commerce platform?

Ans: E-commerce platforms enable businesses to sell products and services online.

Q.4: Why is it important to identify market needs when generating a business idea?

Ans: Because identifying market needs and opportunities is the first step in generating a viable business idea.

Q.5: What is the main purpose of using design thinking in creative problem solving?

Ans: Main purpose of Design thinking are Empathizing, Defining, Ideating, prototyping & Testing.

Q.6: Write the importance of market analysis in a business plan.

Ans: Market analysis involves researching your target market to understand the needs and preferences of your potential customers.

Q.7: How can businesses contribute to environmental sustainability according to the Sustainable Development Goals?

Ans: According to Sustainable development goals by reducing carbon footprints, using renewable resources, and minimizing waste we can contribute the environmental sustainability.

Exercise Multiple Choice Questions

Unit No. 1

1.	The primary function of a system is:						
(a)	To work independently	(b)	To achieve a common goal	(c)	To create new systems	(d)	To provide entertainment
2.	One of the fundamental concepts of any system is:						
(a)	Its size	(b)	Its objective	(c)	Its age	(d)	Its price
3.	An example of a simple system is:						
(a)	A human body	(b)	A computer network	(c)	A thermostat regulating temperature	(d)	The Internet
4.	The basic components of a system are:						
(a)	Users, hardware, software	(b)	Objectives, components, environment, communication	(c)	Inputs, outputs, processes	(d)	Sensors, actuators, controllers
5.	Which of the following describes the Von Neumann architecture's main characteristic?						
(a)	Separate memory for data and instructions	(b)	Parallel execution of instructions	(c)	Single memory store for both program instructions and data	(d)	Multiple CPUs for different tasks
6.	ASCII stand for:						
(a)	American Standard Code for Information Interchange	(b)	Advanced Standard Code for Information Interchange	(c)	American Standard Communication for Information Interchange	(d)	Advanced Standard Communication for Information Interchange
7.	How many bits are used in the standard ASCII encoding?						
(a)	7 bits	(b)	8 bit	(c)	16 bits	(d)	32 bits

8.	How many bytes are used to store a typical integer?						
(a)	1 byte	(b)	2 bytes	(c)	4 bytes	(d)	8 bytes
9.	Which software is used to enhance system performance and security?						
(a)	Operating system	(b)	Utility software	(c)	Application software	(d)	Device drivers
10.	Which of the following is an example of application software?						
(a)	Microsoft Word	(b)	BIOS	(c)	Disk Cleanup	(d)	Device Manager

Unit No. 2

1.	Which of the following Boolean expressions represents the OR operation?						
(a)	A . B	(b)	A + B	(c)	A	(d)	A B
2.	What is the dual of the Boolean expression A . 0 = 0?						
(a)	A + 1 = 1	(b)	A + 0 = A	(c)	A . 1 = A	(d)	A . 0 = 0
3.	Which logic gate outputs true only if both inputs are true?						
(a)	OR gate	(b)	AND gate	(c)	XOR gate	(d)	NOT gate
4.	What is the decimal equivalent of the binary number 1101?						
(a)	11	(b)	12	(c)	13	(d)	14
5.	What is the first step in the systematic process of troubleshooting?						
(a)	Establish a Theory of Probable Cause	(b)	Implement the Solution	(c)	Identify Problem	(d)	Document Findings, Actions, and Outcomes
6.	Why is effective troubleshooting important for maintaining systems?						
(a)	It helps save money on repairs	(b)	It prevents the need for professional help	(c)	It ensures systems operate smoothly and efficiently	(d)	It allows for more frequent system updates
7.	Which step involves coming up with a theory about what might be causing a problem?						
(a)	Test the Theory to Determine the Cause	(b)	Establish a Theory of Probable Cause	(c)	Implement the Solution	(d)	Verify Full System Functionality
8.	After implementing a solution, what is the next step in the troubleshooting process?						
(a)	Document Findings, Actions, and Outcomes	(b)	Test the Theory to Determine the Cause	(c)	Verify Full System Functionality	(d)	Establish a Plan of Action to Resolve the Problem
9.	Why is troubleshooting important in computing systems?						
(a)	It ensures hardware components are always up to date	(b)	It prevents the need for data backups	(c)	It helps keep systems running smoothly and securely	(d)	It eliminates the need for software updates

Unit No. 3

1.	The primary objective of computer networks is:						
(a)	Increase computational power	(b)	Enable resource sharing and data communication	(c)	Enhance graphic capabilities	(d)	Improve software development
2.	Which device is used to connect multiple networks and direct data packets between them?						

(a)	Switch	(b)	Hub	(c)	Router	(d)	Modem
3.	Which layer of the OSI model is responsible for node-to-node data transfer and error detection?						
(a)	Physical Layer	(b)	Data Link Layer	(c)	Network Layer	(d)	Transport Layer
4.	The function of the Domain Name System (DNS) is to:						
(a)	Assign IP addresses dynamically	(b)	Translate domain names to IP addresses	(c)	Secure data communication	(d)	Monitor network traffic
5.	Which method of data transmission uses a dedicated communication path?						
(a)	Packet Switching	(b)	Circuit Switching	(c)	Full-Duplex	(d)	Half-Duplex
6.	Which protocol is used for reliable data transfer in the TCP/IP model?						
(a)	HTTP	(b)	FTP	(c)	TCP	(d)	UDP
7.	The main purpose of a firewall in network security is to:						
(a)	Convert data into a secure format	(b)	Monitor and control network traffic	(c)	Assign IP addresses	(d)	Translate domain names
8.	Which network topology connects all devices to a central hub?						
(a)	Ring	(b)	Mesh	(c)	Bus	(d)	Star
9.	What is a key benefit of using computer networks in businesses?						
(a)	Increase computational power	(b)	Enable resource sharing and efficient communication	(c)	Enhance graphic capabilities	(d)	Improve software development

Unit No. 4

1.	Which of the following best defines computational thinking?						
(a)	A method of solving problems using mathematical calculations only.	(b)	A problem-solving approach that employs systematic, algorithmic, and logical thinking.	(c)	A technique used exclusively in computer programming.	(d)	An approach that ignores real-world applications.
2.	Why is problem decomposition important in computational thinking?						
(a)	It simplifies problems by breaking them down into smaller, more manageable parts.	(b)	It complicates problems by adding more details.	(c)	It eliminates the need for solving the problem.	(d)	It is only useful for simple problems.
3.	Pattern recognition involves:						
(a)	Finding and using similarities within problems	(b)	Ignoring repetitive elements	(c)	Breaking problems into smaller pieces	(d)	Writing detailed algorithms
4.	Which term refers to the process of ignoring the details to focus on the main idea?						
(a)	Decomposition	(b)	Pattern recognition	(c)	Abstraction	(d)	Algorithm design
5.	Which of the following is a principle of computational thinking?						
(a)	Ignoring problem understanding	(b)	Problem simplification	(c)	Avoiding solution design	(d)	Implementing random solutions
6.	Which of the following is a principle of computational thinking?						

(a)	Lists of data	(b)	Graphical representations	(c)	Step-by-step instructions for solving a problem	(d)	Repetitive patterns
7.	Which of the following is the first step in problem-solving according to computational thinking?						
(a)	Writing the solution	(b)	Understanding the problem	(c)	Designing a flowchart	(d)	selecting a solution
8.	Flowcharts are used to:						
(a)	Code a program	(b)	Represent algorithms graphically	(c)	Solve mathematical equations	(d)	Identify patterns
9.	Pseudocode is:						
(a)	A type of flowchart	(b)	A high-level description of an algorithm using plain language	(c)	A programming language	(d)	A debugging tool
10.	Dry running a flowchart involves:						
(a)	Writing the code in a programming language	(b)	Testing the flowchart with sample data	(c)	Converting the flowchart into pseudocode	(d)	Ignoring the flowchart details

Unit No. 5

1.	Which of the following tag is not a correct HTML tag?						
(a)	<div>	(b)		(c)	<head>	(d)	<footer>
2.	What does CSS stand for?						
(a)	Cascading Style Sheets	(b)	Computer Style Sheets	(c)	Creative Style Sheets	(d)	Colorful Style Sheets
3.	Which of the following tag is used to create a hyperlink in HTML?						
(a)	<link>	(b)	<a>	(c)	<href>	(d)	<nav>
4.	Which HTML attribute is used to define inline styles?						
(a)	Class	(b)	Style	(c)	Font	(d)	Styles
5.	Which of the following is the correct syntax for a CSS rule?						
(a)	selector {property: value;}	(b)	selector: {property=value;}	(c)	selector {property=value}	(d)	selector: {property: value;}
6.	In HTML, which markup is used for comments?						
(a)	/* */	(b)	/- -/	(c)	<-- --	(d)	<!-- -->
7.	Which HTML tag is used to create an unordered list?						
(a)		(b)		(c)		(d)	<list>
8.	Which tag is used to display a horizontal line in HTML?						
(a)	 	(b)	<hr>	(c)	<line>	(d)	<hline>

Unit No. 6

1.	What is data?						
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(a)	Processed information	(b)	Raw facts gathered about things	(c)	A collection of numbers only	(d)	A list of observed events
2.	Which of the following is an example of qualitative data?						
(a)	Temperature readings in degrees Celsius	(b)	Number of students in a class	(c)	Favourite ice cream flavours	(d)	Test scores out of 100
3.	How can you organise data to make it easier to analyse?						
(a)	By writing it in long paragraphs	(b)	By creating tables, charts, and graphs	(c)	By storing it in random files	(d)	By keeping it in a messy notebook
4.	What is the main purpose of data collection?						
(a)	To create random numbers	(b)	To gather information to answer questions or make decisions	(c)	To delete old data	(d)	To format text documents
5.	What is the primary purpose of data visualization?						
(a)	To generate random numbers	(b)	To convert text into data	(c)	To make data easier to understand by turning it into pictures	(d)	To hide complex data
6.	Which tool is specifically designed for creating detailed and interactive visualizations?						
(a)	Microsoft Excel	(b)	Google Sheets	(c)	Tableau	(d)	PowerPoint
7.	What is the first step in the data science process?						
(a)	Data Cleaning	(b)	Data Analysis	(c)	Data Collection	(d)	Understanding the problem

Unit No. 7

1.	Which of the following is not a subfield of AI?						
(a)	Machine Learning	(b)	Natural Language Processing	(c)	Computer Vision	(d)	DBMS
2.	Which of these is a security concern in IoT deployments?						
(a)	Device vulnerability	(b)	Data privacy	(c)	Lack of standardization	(d)	all of the above
3.	Which of the following is an application of AI in healthcare?						
(a)	Personalized drug development	(b)	Automated diagnosis	(c)	Remote patient monitoring	(d)	All of the above
4.	What is the primary purpose of using AI techniques in machine learning models?						
(a)	To improve accuracy	(b)	To enhance interpretability	(c)	To reduce computational complexity	(d)	All of the above
5.	What is the key difference between explainable (white box) and unexplainable (black box) AI models?						
(a)	The complexity of the model	(b)	The ability to understand the decision-making process	(c)	The performance of the model	(d)	The training data used
6.	Which of the following is an application of IoT in the transportation domain?						
(a)	Smart traffic management	(b)	Vehicle-to-Vehicle (V2V) communication	(c)	Predictive maintenance of vehicles	(d)	All of the above

Unit No. 8

1.	Why is it important to use computers safely and responsibly?						
(a)	To ensure we can use them more frequently	(b)	To protect our personal information and make wise choices about hardware and software	(c)	To make the computer run faster	(d)	To avoid paying for software
2.	What does "responsible computer usage" include?						
(a)	Choosing the most expensive hardware	(b)	Sharing your passwords with friends	(c)	Being cautious about what you share online and protecting yourself and others	(d)	Ignoring software updates
3.	What should you check to ensure hardware and software compatibility?						
(a)	The color of the hardware	(b)	The system requirements on software packages and match them with your computer's specifications	(c)	The price of the hardware	(d)	The brand of the hardware
4.	Why is it important to use strong, unique passwords?						
(a)	To make your accounts easy to hack	(b)	To help others guess your password	(c)	To make it harder for someone to guess your password and access your accounts	(d)	To avoid installing software updates
5.	What is one reason to avoid clicking on unknown links or downloading files from untrusted sources?						
(a)	They might contain helpful software	(b)	They might contain malware that can harm your device or steal your information	(c)	They are usually cheaper	(d)	They help your device run faster
6.	What does Two-Factor Authentication (2FA) do?						
(a)	It makes your password easier to guess	(b)	It adds an extra layer of security by requiring a second form of verification	(c)	It removes the need for a password	(d)	It reduces the need for software updates
7.	Why should you be cautious when using public Wi-Fi for sensitive transactions?						
(a)	Public Wi-Fi is usually faster	(b)	Public Wi-Fi networks are often less secure	(c)	Public Wi-Fi is free	(d)	Public Wi-Fi always provides encryption
8.	What is an important aspect of responsible use of social media?						
(a)	Sharing personal information like your home address	(b)	Posting photos without considering privacy settings	(c)	Being respectful and avoiding sharing sensitive information publicly	(d)	Ignoring privacy settings
9.	What should you do if you receive an email from an unknown sender asking for personal information?						
(a)	Provide the information requested	(b)	Forward the email to your friends	(c)	Ignore or delete the email	(d)	Open the email and click on any links

Unit No. 9

1.	What is entrepreneurship?						
(a)	The process of starting a new business or organization	(b)	The process of buying and selling stocks	(c)	The process of working for a large company	(d)	The process of creating a marketing campaign
2.	What is a key characteristic of entrepreneurs?						
(a)	Avoiding risks	(b)	Seeking job security	(c)	Innovation	(d)	Following established methods
3.	An example of a digital technology used by modern entrepreneurs is:						
(a)	Newspaper advertisements	(b)	Television commercials	(c)	Mobile apps	(d)	Door-to-door sales
4.	Which of the following is NOT a technique for identifying market needs?						
(a)	Surveys and Questionnaires	(b)	Market Research	(c)	Observation	(d)	Brainstorming
5.	The first step in the design thinking process is:						
(a)	Prototyping	(b)	Testing	(c)	Empathizing	(d)	Defining
6.	The primary purpose of creating a business plan is:						
(a)	To attract investors	(b)	To outline strategies for growth	(c)	To study market trends	(d)	To implement digital marketing strategies
7.	What does market analysis involve?						
(a)	Calculating revenue forecasts	(b)	Researching competitors and understanding customer needs	(c)	Developing pricing strategies	(d)	Implementing digital marketing campaigns
8.	Which Sustainable Development Goal (SDG) focuses on affordable and clean energy?						
(a)	SDG5	(b)	SDG7	(c)	SDG12	(d)	SDG17

Answer Keys

Unit NO. 1

Question	Answer
1	b
2	b
3	c
4	b
5	c
6	a
7	a
8	c
9	b
10	a

Unit NO. 2

Question	Answer
1	b
2	a
3	b
4	c
5	c
6	c
7	b
8	c
9	c

Unit NO. 3

Question	Answer
1	b
2	c
3	b
4	b
5	b
6	c
7	d
8	b
9	b

Unit NO. 4

Question	Answer
1	b
2	a
3	a
4	c
5	b
6	c
7	b
8	b
9	b
10	b

Unit NO. 5

Question	Answer
1	d
2	a
3	b
4	b
5	a
6	b
7	a
8	b

Unit NO. 6

Question	Answer
1	b
2	c
3	b
4	b
5	c
6	c
7	a

Unit NO. 7

Question	Answer
1	d
2	d
3	d
4	a
5	b
6	d

Unit NO. 8

Question	Answer
1	b
2	c
3	b
4	c
5	b
6	b
7	b
8	c
9	c

Unit NO. 9

Question	Answer
1	a
2	c
3	c
4	d
5	c
6	b
7	b
8	b