TOUCHPAD
Computer Textbook Series

11

Computer Science

with

PYTHON

(Chapters 1 to 5)

Beta*

*Updated Copy coming soon

ORANGE

Class XI Answer Key

Computer Science with PYTHON

Unit I: Computer Systems and Organisation

1. Computer Fundamentals

Assessment

A.	1. a	2. b	3. b	4. a	5. c
	6. d	7. a	8. b	9. c	10. ?
B.	1. False	2. True	3. True	4. True	5. False
	6. True	7. False	8. True	9. False	
C.	1. System software		2. RAM, ROM	3. Utility	4. Bit
	5. Byte	6. USB	7. Operating system		8. Biometric scanner

D. 1. A computer is an electronic device that accepts input data from the user, processes it, and produces results. It comprises of the following components:

a. Input Unit

b. Central Processing Unit (CPU)

c. Memory Unit

d. Output Unit

2. Hardware and software are both essential for a computer to function. Hardware refers to the physical components of a computer, such as the CPU, memory, storage devices, and input/output devices. Software, on the other hand, consists of the programs and operating systems that run on the hardware. Without hardware, software cannot operate, and without software, hardware is useless. Together, they enable the computer to perform tasks such as processing data, executing applications, and managing resources.

3. Computer is an electronic device that accepts input data from the user, processes it, and produces results. It comprises of the following components:

- Input Unit
- Central Processing Unit (CPU)

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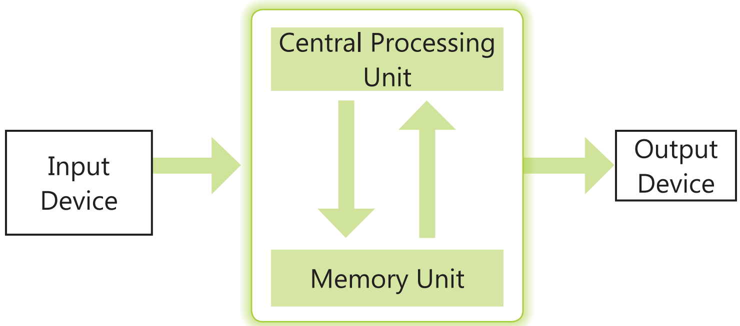
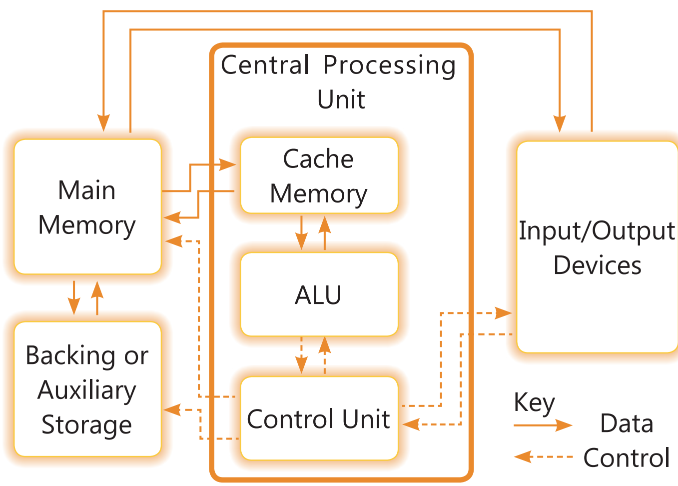
- Memory Unit
- Output Unit



4. A light pen is a pointing device that allows users to interact with a computer screen by detecting light from the screen, whereas a mouse is a handheld pointing device that detects two-dimensional motion relative to a surface. A light pen is used directly on the display surface, while a mouse is used on a separate flat surface.
5. A barcode encodes information in the form of a sequence of lines of different lengths, heights and widths. A bar code reader fetches the information from a barcode printed on a product or a service by scanning its bar code. The sealed packets of any product at any shop typically includes a barcode containing information about the products and their prices. It is commonly used in retail stores, libraries, and warehouses to quickly retrieve product information, manage inventory, and streamline checkout processes.
6. The Central Processing Unit (CPU), also called the processor, is the computer's brain and is responsible for carrying out all the processing in the computer system. Given a task, the CPU is provided with a sequence of instructions in the form of a program.

   The CPU controls the entire data flow and instructions inside the computer. To facilitate functioning, the CPU comprises the following components:



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- **Registers:** While processing an instruction, the CPU needs to store in its local storage the instruction, memory addresses being referred during the instruction execution, data operands (on which operation is to be carried out), and the result of the computation. For storing and accessing the information mentioned above, the CPU requires high-speed temporary storage units, called registers. Several registers are also equipped with circuitry for performing elementary operations like addition and subtraction. However, as the registers are much more expensive than the main memory, the CPU has only a limited number of them.
- **Arithmetic Logic Unit (ALU):** The arithmetic Logic Unit (ALU) of the CPU performs all arithmetic (+,-,*,/) and logical (>,<,>=,<=,<>) operations. While the result of an arithmetic operation is a numeric value, the result of a logical operation (such as 7<8) is either True or False. The values True and False are called Boolean values in honour of George Boole, who developed an algebra (again named, Boolean algebra, in his honour) that constitutes the basis of all computer computations. The data for executing an instruction may already be available in the registers or fetched in the ALU registers from the computer's memory. The result of a computation is often stored in the computer's memory.
- **Control Unit (CU):** The Control Unit (CU) controls the execution of instructions and the flow of data amongst the components of a computer, i.e., from input devices to memory, memory to ALU and vice versa, and from memory to output devices. It sends instructions in the form of control signals to ALU to perform the required arithmetic and/or logical operations.

7. Biometric sensors are used in:

   Security systems: To authenticate users based on their unique biological traits, such as fingerprint, retina, or facial recognition.

   Time and attendance systems: To track employee attendance and working hours using biometric data.

8. i. 1 GB = 2^{20}KB

   ii. 1 YB = 2^{50}GB

   iii. 1 KB = $2^{(-30)}$TB

   iv. 1 PB = 2^{30}MB

9. i. Primary memory and secondary memory:

   Primary memory (RAM) is fast, volatile memory used for storing data temporarily while the computer is running. Secondary memory (HDD, SSD) is slower, non-volatile memory used for long-term storage of data and programs.

   ii. System software and application software:

   System software includes the operating system and utility programs that manage computer resources and provide a platform for running application software. Application software includes programs designed to perform specific tasks for users, such as word processors, web browsers, and games.

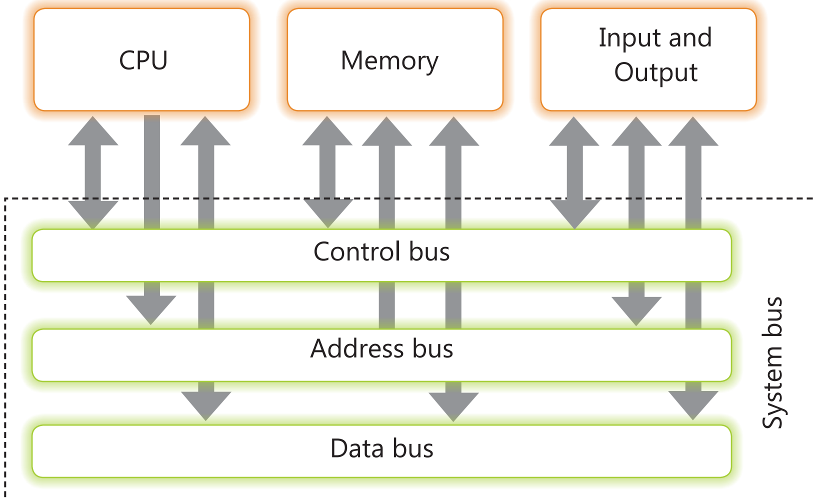
iii) Open source software and proprietary software:

Open source software is software with source code that anyone can inspect, modify, and enhance. Proprietary software is software that is owned by an individual or company and is distributed under a license that restricts modification and sharing.

10. Data is transferred between different components of a computer system (CPU to primary memory and vice versa or primary memory to secondary memory, or cache memory to CPU and vice versa) using physical connections called buses. There are three types of buses:

- **Data Bus:** It is used to transfer data between different CPU components.
- **Address Bus:** It is used to transfer addresses of memory locations for the CPU to perform read/write operations in the memory.
- **Control Bus:** It is used to transfer control signals between various computer components.

The data bus, address bus, and control bus together constitute the system bus. Figure 1.6 depicts the flow within the system bus. Data entered from an input device is stored in the main memory. The CPU then accesses this data using a data bus. The address of the memory location from where data will be accessed is communicated via the address bus. The read or write instructions are communicated through the control bus. Similarly, to write data into the memory, the CPU places the data on the data bus, and the address of the memory location where the data has to be written is placed on the address bus. Once this is done, a control signal is issued to write the data from the CPU to the designated memory location.



11. The functions of an operating system include:

- **Process management:** Manages the creation, scheduling, and termination of processes.
- **Memory management:** Allocates and deallocates memory space as needed by programs.
- **File system management:** Manages the creation, deletion, and access of files on storage devices.
- **Device management:** Controls and coordinates the use of hardware devices.

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- **User interface:** Provides a way for users to interact with the computer, such as through a graphical user interface (GUI) or command-line interface (CLI).
- **Security and access control:** Protects data and resources from unauthorized access.

12. Three types of user interfaces are:
    - **Graphical User Interface (GUI):** Uses visual elements like windows, icons, and menus for interaction.
    - **Command-Line Interface (CLI):** Uses text-based commands for interaction.
    - **Touch User Interface (TUI):** Uses touch-based inputs for interaction, commonly found on smartphones and tablets.

Case-based Questions

1. a. Joey should use presentation software to create his presentation. An example of such software is Microsoft PowerPoint.

   b. The school is using customized application software. This is because the software has been specifically modified or developed to meet the specific needs and feedback of the students.

   c. There could be several reasons for this issue:
   - The printer driver may not be installed or may be outdated. Installing or updating the printer driver can solve this problem.
   - The printer may not be properly connected to the computer or network.
   - There could be a hardware issue with the printer or the computer's USB port.
   - The printer might be out of paper or ink, or there could be a paper jam.
   - The printer may not be set as the default printer in the computer's settings.

   d. **Interpreted Language:** In an interpreted language, the code is executed line-by-line by an interpreter at runtime. This means that the program can be run directly from the source code without the need for prior compilation. Examples include Python, JavaScript, and Ruby.

   Compiled Language: In a compiled language, the source code is first converted into machine code by a compiler. This machine code is then executed by the computer's hardware. The compilation step happens before the program is run, and the resulting machine code is what gets executed. Examples include C, C++, and Java.

2. a. The user interacts by typing commands using a Command-Line Interface (CLI).

   b. The interface that uses human touch to give instructions to the computer is a Touch User Interface (TUI).

   c. The interface that comprises menus and icons that are accessible by double-clicking is a Graphical User Interface (GUI).

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2. Number Systems and Encoding Schemes

Assessment

A. 1. a 2. d 3. a 4. b 5. b
6. b 7. a 8. d 9. b 10. c

B. 1. False 2. False 3. True 4. True 5. False

C. 1. the most significant bit 2. 10 3. three 4. one
5. the English

D.
1. Hexadecimal numbers are often used in computer science and digital electronics to represent binary data in a more readable form. For example, memory addresses and color codes in web design use hexadecimal representation.
2. RGB codes are expressed as hexadecimal numbers because it is a concise way to represent large binary numbers, making it easier to read and understand color values.
3. UNICODE was developed to provide a universal character encoding standard that can represent text and symbols from all the writing systems in the world, ensuring consistent encoding, representation, and handling of text.
4. One advantage of UNICODE is that it supports a wide range of characters and symbols from different languages and scripts, enabling global interoperability and data exchange.
5. **ASCII:** American Standard Code for Information Interchange

   ISCII: Indian Script Code for Information Interchange

   UTF: Unicode Transformation Format
6. a. 25610=1000000002

   b. 39.56: 3910=1001112

   0.5610≈0.100011001100110011001100112

   So, 39.5610≈100111.100011001100110011001100112

   c. 508.8:

   50810=1111111002

   0.810≈0.110011001100110011001100112

   So, 508.810≈111111100.110011001100110011001100112
7. a. $5063_8 = 5 \times 8^3 + 0 \times 8^2 + 6 \times 8^1 + 3 \times 8^0$

   $= 5 \times 512 + 0 \times 64 + 6 \times 8 + 3 \times 1$

   $= 2560 + 48 + 3 = 2611_{10}$

b. 17_8 $=1 \times 8^1 + 7 \times 8^0 = 8 + 7 = 15_{10}$

0.52_8 $= 5 \times 8^{-1} + 2 \times 8^{-2} = 5 \times 0.125 + 2 \times 0.015625 = 0.625 + 0.03125 = 0.65625_{10}$

So, $17.52_8 = 15.65625_{10}$

c. 327:

327_8 $= 3 \times 8^2 + 2 \times 8^1 + 7 \times 8^0$

$= 3 \times 64 + 2 \times 8 + 7 \times 1$

$= 192 + 16 + 7 = 215_{10}$

8. a. 7208:

$7208_{10} = 1C2816$

b. 93.5:

93_{10} $= 5D_{16}$

0.5_{10} $= 0.8_{16}$

So, $93.5_{10} = 5D.8_{16}$

c. 199.60:

199_{10} $= C7_{16}$

$0.60_{10} \approx 0.9A_{16}$

So, $199.60_{10} \approx C7.9A_{16}$

9. a. 7C6:

$7C6_{16}$ $= 7 \times 16^2 + C \times 16^1 + 6 \times 160$

$= 7 \times 256 + 12 \times 16 + 6 \times 1$

$= 1792 + 192 + 6 = 1990_{10}$

b. 95.A:

95_{16} $= 9 \times 16^1 + 5 \times 16^0 = 9 \times 16 + 5 \times 1 = 144 + 5 = 149_{10}$

$0.A_{16}$ $= A \times 16–1 = 10 \times 0.0625 = 0.625_{10}$

So, $95.A_{16} = 149.625_{10}$

c. ABC.D:

$ABC16 = A \times 16^2 + B \times 16^1 + C \times 16^0$

$= 10 \times 256 + 11 \times 16 + 12 \times 1 = 2560 + 176 + 12 = 2748_{10}$

$0.D_{16}$ $= D \times 16^{-1} = 13 \times 0.0625 = 0.812510$

So, $ABC.D_{16} = 2748.8125_{10}$

10. a. 1110001110:

$1110001110_2 = 38E_{16}$

b. 10101010:

$10101010_2 = AA_{16}$

c. 1100.01:

$1100.01_2 = C.2_{16}$

11. a. 245.8:

- Integer Part (245):

  $245_{10} = 11110101_2$

- Fractional Part (0.8):

  $0.8 \times 2 = 1.6 \rightarrow 1$

  $0.6 \times 2 = 1.2 \rightarrow 1$

  $0.2 \times 2 = 0.4 \rightarrow 0$

  $0.4 \times 2 = 0.8 \rightarrow 0$

  $0.8 \times 2 = 1.6 \rightarrow 1$

  This repeats as $0.8_{10} = 0.1100\overline{11}_2$

  So, $245.8_{10} \approx 11110101.1100\overline{11}_2$

b. 825:

$825_{10} = 1100111001_2$

c. 199.6:

- Integer Part (199):

  $199_{10} = 11000111_2$

- Fractional Part (0.6):

  $0.6 \times 2 = 1.2 \rightarrow 1$

  $0.2 \times 2 = 1.4 \rightarrow 0$

  $0.4 \times 2 = 0.8 \rightarrow 0$

  $0.8 \times 2 = 1.6 \rightarrow 1$

  This repeats as $0.6_{10} = 0.1001\overline{10}_2$

  So, $199.6_{10} \approx 11000111.1001\overline{10}_2$

12. a. BDA:

BDA16 = 10111101 10102

b. 5FA1:

$5F_{16} = 0101\ 1111_2$

$A1_{16} = 1010\ 0001_2$

So, $5F.A1_{16} = 0101\ 1111.1010\ 0001_2$

c. 892:

892_{16} = 10000 1001 0010_2

13. 10001002=68_{10}='D'

10000012=65_{10}='A'

10101002=84_{10}='T'

10001002=68_{10}='D'

14. 'R' = 82_{10} = 01010010_2

'e' = 101_{10} = 01100101_2

'd' = 100_{10} = 01100100_2

So, Red in binary ASCII encoding is: '01010010 01100101 01100100'

Case-based Questions

1. Nirankar's computation has a mistake in the placement of powers of 16 and their multiplication. Here is the correct computation:

$(D20.B1)_{16}$

$= D \times 16^2 + 2 \times 16^1 + 0 \times 16^0 + B \times 16^{-1} + 1 \times 16^{-2}$

$= 13 \times 256 + 2 \times 16 + 0 \times 1 + 11 \times 0.0625 + 1 \times 0.00390625$

$= 3328 + 32 + 0 + 0.6875 + 0.00390625$

$= 3360.69140625_{10}$

So, the correct computation is $(3360.69140625)_{10}$

2. Sheikh's table for colors and decimal and hexadecimal values is as follows:

Name of Colour	Decimal Value	Hexadecimal Value
Yellow	(255, 255, 0)	(FF, FF, 00)
Red	(256, 0, 0)	(FF, 00, 00)
Blue	(0, 0, 255)	(00, 00, FF)
Black	(0, 0, 0)	(00, 00, 00)
Green	(0, 255, 0)	(00, FF, 00)

(256, (0(0, 255, 0)

3. Saptarishi's task to encode the words using ASCII and their binary equivalents is as follows:

Word	ASCII Code	Binary equivalent
BOT	66 79 84	01000010 01001111 01010100
KEY	75 68 89	01001011 01000100 01011001

NUMber	78 85 77 98 101 114	1001110 1010101 1001101 1100010 1100101 1110010
Yes–NO	89 101 115 45 78 79	01011001 01100101 01110011 00101101 010001110 01001111

So, here are the words with their ASCII codes and binary equivalent.

1. **BOT:**
   - ASCII Code: 66 79 84
   - Binary Equivalent: 01000010 01001111 01010100
2. **KEY:**
   - ASCII Code: 75 68 89
   - Binary Equivalent: 01001011 01000100 01011001
3. **NUMber:**
   - ASCII Code: 78 85 77 98 101 114
   - Binary Equivalent: 01001110 01010101 01001101 01100010 01100101 01110010
4. **Yes–NO:**
   - ASCII Code: 89 101 115 45 78 79
   - Binary Equivalent: 01011001 01100101 01110011 00101101 01001110 01001111

3. Boolean Logic

Assessment

A.	1. c	2. a	3. b	4. c	5. c
	6. d	7. d	8. a	9. b	10. a
B.	1. False	2. True	3. False	4. False	5. False
	6. True	7. False	8. True	9. False	
C.	1. George Boole	2. one	3. binary	4. 1	5. NOR, NAND
	6. Truth Table	7. OR	8. complement	9. NAND	10. XNOR

D. 1. George Boole developed Boolean algebra, which provides a sound basis for studying logic circuits. Although one can define a Boolean algebra of 2, 4, 8, or more elements, in this book, we will restrict ourselves to the Boolean algebra of two elements as it serves as the basis of designing computer circuits.

Boolean algebra β is defined by a triplet $\beta = < \mathbf{S}, +, \bullet >$, where **S** is a set having two elements 0 and 1.

1. Closure Property

(1) $a + b \in S, \forall a, b \in S$

(2) $a \bullet b \in S, \forall a, b \in S$

2. Commutative Property

(1) $a + b = b + a, \forall a, b \in S$

(2) $a \bullet b = b \bullet a, \forall a, b \in S$

3. Distributive Property

(1) $a + (b \bullet c) = (a + b) \bullet (a + c), \forall a, b, c \in S$

(2) $a \bullet (b + c) = a \bullet b + a \bullet c, \forall a, b, c \in S$

4. Identity Property

There exist two elements in **S**, denoted by 0 and 1, called identity of + and ● respectively, satisfying

(1) $a + 0 = a, \forall a \in S$

(2) $a \bullet 1 = a, \forall a \in S$

5. Complementarity Property

For each **a** ∈ **S**, there exists an element in S, denoted by **a**′, such that

(1) $a + a' = 1$

(2) $a \bullet a' = 0$

a′ is called the complement of **a**.

2. a. Associative Law:

(i) $(a + b) + c = a + (b + c)$

(ii) $(a \bullet b) \bullet c = a \bullet (b \bullet c)$

A	B	C	(A + B)	(A + B) + C	(B + C)	A + (B + C)
0	0	0	0	0	0	0
0	0	1	0	1	1	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	1	1	0	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

(ii) (A.B). C = A.(B.C)

A	B	C	A.B	(A.B).C	(B.C)	A.(B.C)
0	0	0	0	0	0	0
0	0	1	0	1	1	1
0	1	0	1	1	1	1

0	1	1	1	1	1	1
1	0	0	1	1	0	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

b. Distributive Law

(i) A.(B+C) = (A.B) + (A.C)

A	B	C	(B + C)	A. (B + C)	A.B	A.C	A.B + A.C
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

(ii) A + B.C = (A+B) . (A+C)

A	B	C	BC	A + BC	A + B	A + C	(A+B). (A+C)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

3. a.

A	B	C	A+C (LHS)	A	A′.C	A + A′.C	B.C	A + A′.C + B.C (RHS)
0	0	0	0	0	0	0	0	0
0	0	1	0	1	1	0	0	1
0	1	0	0	1	0	0	0	0
0	1	1	1	1	1	1	1	1
1	0	0	1	0	0	1	0	1
1	0	1	1	0	0	1	0	1
1	1	0	1	0	0	1	0	1
1	1	1	1	0	0	1	1	1

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b.

X	Y	Z	X + Z (LHS)	X′	X′.Z	X + X′Z	Y.Z	X + X′.Z + Y.Z (RHS)
0	0	0	0	1	0	0	0	0
0	0	1	1	1	1	1	0	1
0	1	0	0	1	0	0	0	0
0	1	1	1	1	1	1	1	1
1	0	0	1	0	0	1	0	1
1	0	1	1	0	0	1	0	1
1	1	0	1	0	0	1	0	1
1	1	1	1	0	0	1	1	1

4. a.

U	V	W	F(U, V, W)
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0

b.

A	B	C	F(A, B, C)
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

5. a. $F = (X^1 + Y) + (Y . Z^1)$

   b. $F = (P^1 + Q) + (Q . R^1)$

   c. $Y = (U . V^1 + U^1 . W^1)$

   d. $F = (P . Q^1) + (P^1 . R)$

6. De Morgan's laws: ∀ **a**, **b** ∈ **S**

   (i) (**a** + **b**)′ = **a**′ ● **b**′

(ii) $(a \bullet b)' = a' + b'$

Proof: (i)To prove $(a + b)' = a' \bullet b'$, we shall show that $a' \bullet b'$ is the complement of $(a + b)$

Find we prove: $(a + b) + (a' \bullet b') = 1$

$(a + b) + (a' \bullet b')$

$= a + (b + (a' \bullet b'))$ (Using associativity property)

$= a + ((b + a') \bullet (b + b'))$ (Using distributive property of +)

$= a + (b + a') \bullet 1$ (Using complementarity property)

$= a + (b + a')$ (Using multiplicative identity)

$= a + (a' + b)$ (Using commutative property)

$= (a + a') + b$ (Using associativity property)

$= 1 + b$ (Using complementarity property)

$= 1$ (Using Theorem 2 (i))

Next, we prove: $(a + b) \bullet (a' \bullet b') = 0$

$(a + b) \bullet (a' \bullet b')$

$= a \bullet (a' \bullet b') + b \bullet (a' \bullet b')$ (Using distributive property of •)

$= (a \bullet a') \bullet b' + b \bullet (a' \bullet b')$ (Using associative property)

$= 0 \bullet b' + b \bullet (a' \bullet b')$ (Using complementarity property)

$= 0 + b \bullet (a' \bullet b')$ (Using theorem 2 (ii))

$= b \bullet (a' \bullet b')$ (Using additive identity)

$= b \bullet (b' \bullet a')$ (Using commutative property)

$= (b \bullet b') \bullet a'$ (Using associative property)

$= 0 \bullet a'$ (Using complementarity property)

$= 0$ (Using theorem 2 (ii))

7. a. (i) $a + a \bullet b = a$

   (i) $a \bullet (a + b) = a$

   b. (1) $a + (b \bullet c) = (a + b) \bullet (a + c), \forall a, b, c \in S$

   (2) $a \bullet (b + c) = a \bullet b + a \bullet c, \forall a, b, c \in S$

   c. $\forall a \in S, (a')' = a$

8. $(A . B)^1 = A^1 + B^1$

   DeMorgan's First Theorem Proof using Truth Table

A	B	A′	B′	A.B	(A.B)′	A′+B′
0	0	1	1	0	1	1
0	1	1	0	0	1	1
1	0	0	1	0	1	1
1	1	0	0	1	0	0

9. ??

   b. 95.A:

   $95_{16} = 9 \times 16^1 + 5 \times 16^0 = 9 \times 16 + 5 \times 1 = 144 + 5 = 149_{10}$

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10. a.

X	X^1	$X+X^1$
0	1	1
1	0	1

The given equation is true and verified

b.

X	X^1	$X+X^1$
0	1	0
1	0	0

The given equation is true and verified

c.

X	X + 1
0	1
1	1

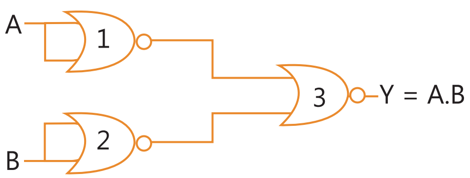
The given equation is true and verified

d.

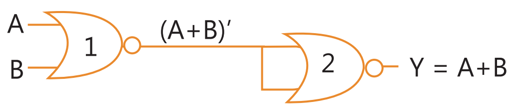
u	v	u^1	$u^1 + v$	$u.(u^1 + v)$	u + v
0	0	1	1	0	0
0	1	1	1	0	1
1	0	0	0	0	1
1	1	0	1	1	1

The given equation is FALSE.

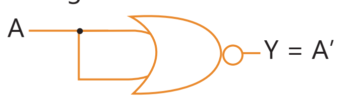
11. a. AND gate using only NOR gate



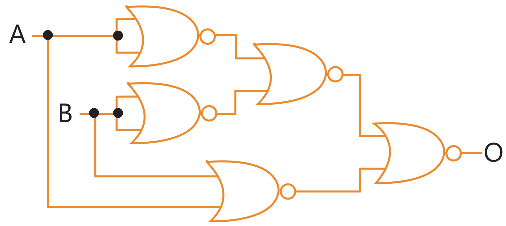
b. OR gate using only NOR gate



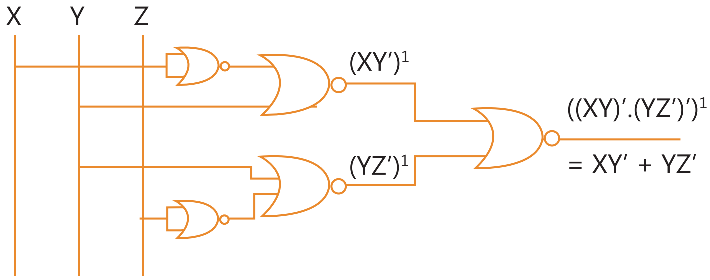
c. NOT gate using only NOR gate



d. XOR gate using only NOR gate



12. XY′ + YZ′



13. (i) A.(B+C) = (A.B) + (A.C)

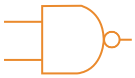
A	B	C	B + C	A. (B + C)	A.B	A.C	A.B + A.C
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

(ii) A + B.C = (A+B) . (A+C)

A	B	C	BC	A+B+C	A+B	A+C	(A+B) . (A+C)
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	1	1	1	1	1
1	0	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	1	0	0	1	1	1	1
1	1	1	1	1	1	1	1

IMPRINT 1

14. 2-input NAND gate



3-input NAND gate

15. 2-input NAND gate

X	**Y**	**Y^1**	**$X+Y^1$**	**$(X + Y^1)^1$**
0	0	1	1	0
0	1	0	0	1
1	0	1	1	0
1	1	0	1	0

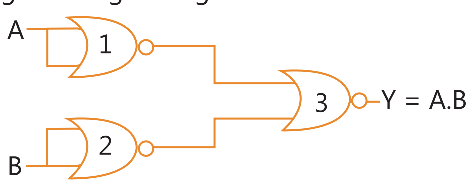
16.

A	B	C	A^1	AB	BC	CA^1	$AB + BC + CA^1$ (LHS)	$AB + CA^1$ (RHS)
0	0	0	1	0	0	0	0	0
0	0	1	1	0	0	1	1	1
0	1	0	1	0	0	0	0	0
0	1	1	1	0	1	1	1	1
1	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0
1	1	0	0	1	0	0	1	1
1	1	1	0	1	1	0	1	1

The given expression is true and verified.

Case-based Questions

1. Implementing AND gate using NOR gate



2. Circuit -1: AND Gate

Truth Table:

A	B	(A • B)'
0	0	1
0	1	1
1	0	1
1	1	0

Circuit -1: AND Gate

Truth Table:

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

Unit II: Computational Thinking and Programming–I

4. Problem Solving

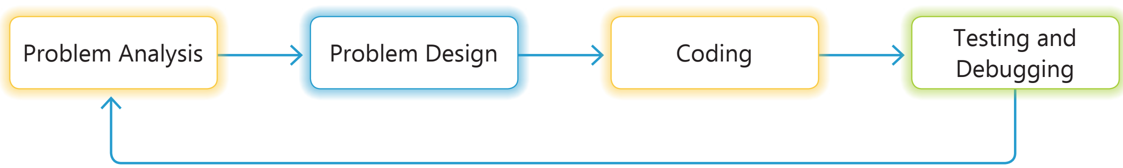
Assessment

A. 1. c 2. d 3. b 4. c
5. b 6. b

B. 1. True 2. False 3. False 4. True 5. True

C. 1. 1.flowchart, pseudocode 2. algorithm 3. pseudocode
4. testing and debugging

D. 1. It depicts the steps in problem solving using computers. The first step is to define a problem clearly. The second step is to analyze the problem and then develop a solution strategy (algorithm). Thereafter, in the coding phase, the code is written to implement the algorithm. Finally the code is tested for any type of errors in the Testing and Debugging phase.



2. - It requires some inputs from the user
   - It requires several steps to be executed
   - Each step of an algorithm must be executable
   - It produces some output
   - It should terminate after certain number of steps.
3. Input : Any two numbers (say N1, N2)

   Process: Compute the product

   Output: product of N1 and N2

```
input N1,  N2
product = N1 * N2
Print product
```

4. Input : Any two numbers (say N1, N2)

   Process: Check whether N1 is greater than N2

   Output: product

```
input N1,  N2
if N1 > N2 then
     Print N1
else if N2 > N1 then
     Print N2
else
     Print " Both are Equal"
```

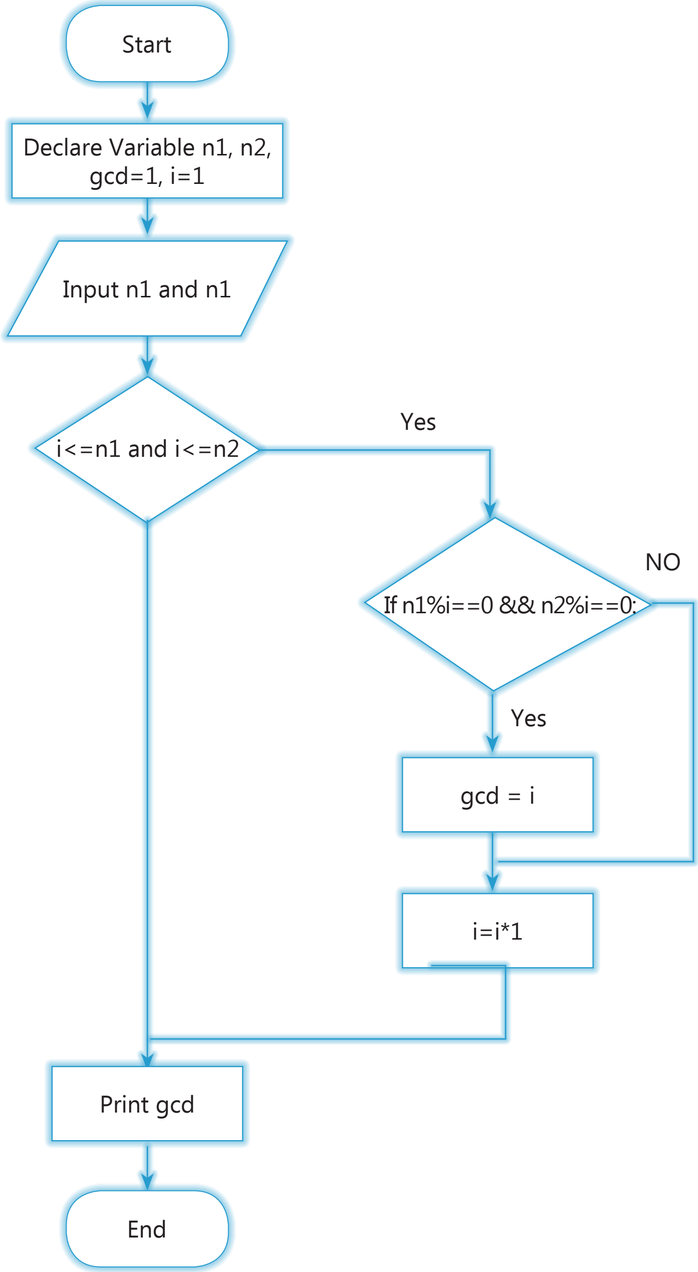
5. Input : Marks of four subjects - compSc, phy, chem, math

   Process: Computer aggregate and percentage of marks. Maximum Marks (say MM) is 100

   Output: Aggregate Marks (say aggr) and Percentage (say perc)

```
input compSc, phy, chem, math
aggr = compSc + phy + chem + math
perc = aggr / 400
Print aggr, perc
```

6.



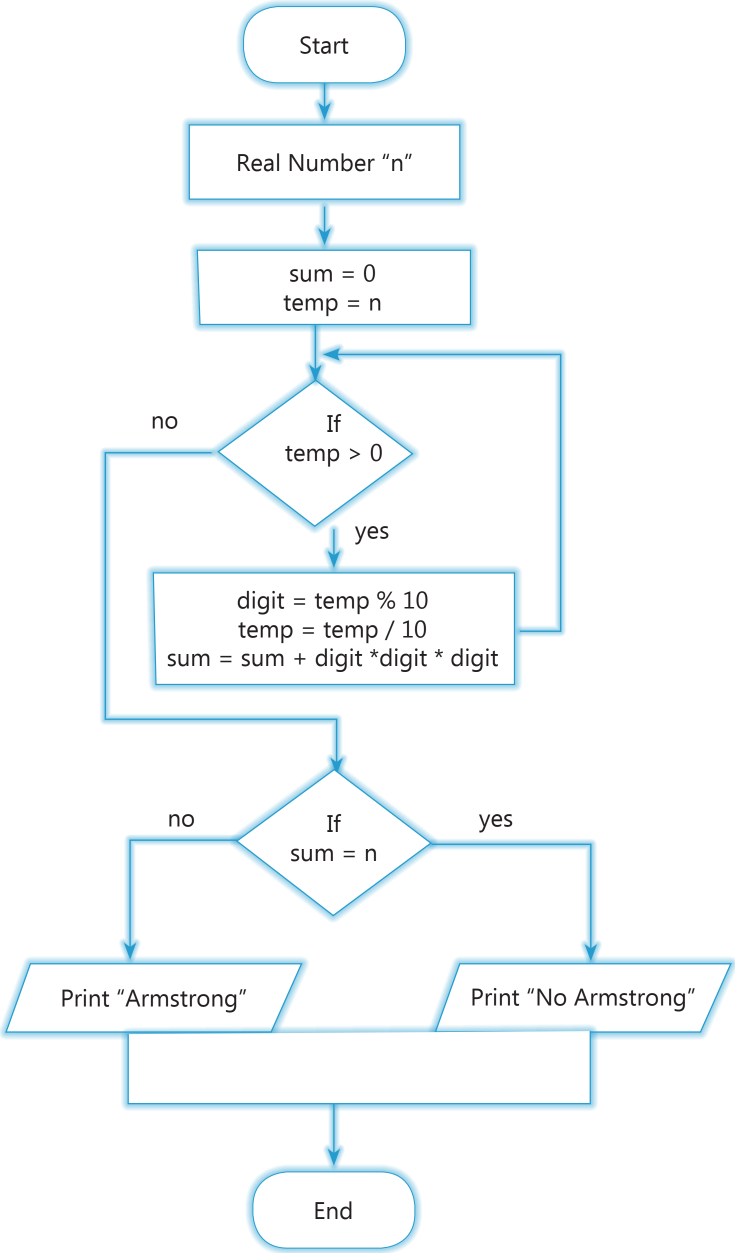
7. Input : Any number (say N1)

Process: Check whether the number is a prime number or not

Output: Display “PRIME NUMBER ” if the number is prime, and “NOT PRIME” if it is not a prime number

8.

Flowchart - Armstrong Number



9. 1. `Start`

2. `Sum = 0`

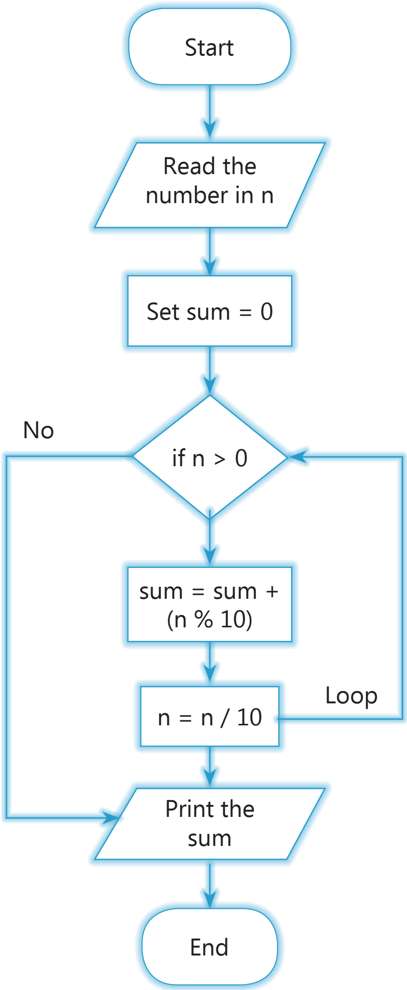
3. `num = 1`

4. `sum = sum + num`

5. `num =  num + 1`
6. `if num <= 10 then go to step 4 else print Sum`
7. `End`

10.
1. `Start`
2. `Input N1`
3. `digits = 0`
4. `num = N1 // 10`
5. `digits = digits + 1`
6. `if num !=0 then go to step 4 else display digits`
7. `End`

11.



Flowchart to find sum of digits of a number

12. 1. b 2. a 3. c

5. Getting Started With Python Programming

Assessment

A. 1. c 2. b 3. d 4. a 5. b

B. 1. True 2. False 3. False 4. False 5. True

C. 1. platform independent 2. Python script 3. .py

4. F5 5. print()

D.
1. Python is called an open source language because one can download the source code, modify it, and then redistribute it.
2. The various built-in functions within these libraries perform specialised tasks such as geosciences, life science, computational physics, etc. Generic libraries for machine learning and deep learning aid the development of several scientific and business applications.
3. It is easier to debug as it is an interpreter based language.
4. One advantage of UNICODE is that it supports a wide range of characters and symbols from different languages and scripts, enabling global interoperability and data exchange.
5. Python is considered a dynamically types language as it obviates the need to declare the types of variables.
6. This is because it is dynamically typed and interpreter based language.
7. Interactive Development Learning Environment

E.
1.
   - Open any browser and type httpp://www.python.org/downloads/in the address bar.
   - To download the desires Python version compatible with the operating system installed on your computer, click on the appropriate link. The click will initiate the download.
   - Once the Python is downloaded, double-click on he executable file to run the setup. Follow the instructions to install the software.
2. print("ANOKHI")
3. a. 22.166666666666668

   b. 78.57142857142857
4. I am learning Python

   I am a class 11 student

   I will now play with numbers

   150

   25.142857142857142

Assertion and Reasoning Based Questions

1. b 2. a