11

Computer Science

BugFree

Guide prepared by Based on the New Syllabus and New Text Book

HIGHER SECONDARY FIRST YEAR

TouchUs

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An investment in Knowledge pays the best Interest.

- Benjamin Franklin

CONTENT CREATION

Mr. Kannan V., MCA., ME., B.Ed.,
Post Graduate Teacher, Perumbakkam

YouTube Channel Link

https://www.youtube.com/channel/UCQwKpNgWCvZDTY5MWshAdPA

For Contact

Mail Id. kannanvenu8@gmail.com

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INTRODUCTION TO COMPUTERS CHAPTER 1

PART - I

Choose the correct answer

1. First generation computers used
   A) Vacuum tubes B) Transistors C) Integrated circuits D) Microprocessors
2. Name the volatile memory
   A) ROM B) PROM **C) RAM** D) EPROM
3. Identify the output device
   A) Keyboard B) Memory **C) Monitor** D) Mouse
4. Identify the input device
   A) Printer **B) Mouse** C) Plotter D) Projector
5. ..... Output device is used for printing building plan.
   A) Thermal printer **B) Plotter** C) Dot matrix D) inkjet printer
6. Which one of the following is used in ATM machines?
   A) Touch Screen B) speaker C) Monitor D) Printer
7. When a system restarts which type of booting is used?
   A) Warm booting B) Cold booting C) Touch boot D) Real boot
8. Expand POST
   A) Post on self Test B) Power on Software Test
   C) Power on Self Test D) Power on Self Text
9. Which one of the following is the main memory?
   A) ROM **B) RAM** C) Flash drive D) Hard disk
10. Which generation of computer used IC's?
    A) First B) Second **C) Third** D) Fourth

PART - II

Short Answers

1. What is a computer?

A Computer is an electronic device that takes raw data as an input from the user and processes it under the control of a set of instructions, produces a result, and saves it for future use.

2. Distinguish between data and information.

Data

Data is defined as an unprocessed collection of raw facts, suitable for communication, interpretation or processing.

Example,

134, 16, 'Kavitha', 'C'

Information

Information is a collection of facts from which conclusions may be drawn.

Example

Kavitha is 16 years old.

3. What are the components of a CPU?

- Control unit
- Arithmetic and logic unit (ALU)
- Memory unit

4. What is the function of an ALU?

The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations.

5. Write the functions of control unit.

The control unit controls the flow of data between the CPU, memory and I/O devices. It also controls the entire operation of a computer.

6. What is the function of memory?

- **The primary memory** is used to temporarily store the programs and data when the instructions are ready to execute.
- **The secondary memory** is used to store the data permanently.

7. Differentiate Input and output unit.

- **Input unit** is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.

  Example Keyboard, mouse, etc.
- **An Output** Unit is ***any hardware component that conveys information to users in an understandable form***.

  Example Monitor, Printer etc.

8. Distinguish Primary and Secondary memory.

- The Primary Memory is volatile, that is, the content is lost when the power supply is switched off.

  Example RAM
- The Secondary memory is non-volatile, that is, the content is available even after the power supply is switched off.

  Example Hard disk, CD-ROM and DVD ROM.

PART - III

Explain in Brief

1. What are the characteristics of a computer?

Computers have revolutionized our lives with their accuracy and speed of performing a job, it is truly remarkable.

2. Write the applications of computer.

Computers are seen everywhere around us, in all spheres of life, in the field of education, research, travel and tourism, weather forecasting, social networking, e-commerce etc.

3. What is an input device? Give two examples.

- **Input unit** is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.

  Example Keyboard, mouse, etc.

4. Name any three output devices.

- **Monitor-** Monitor is the most commonly used output device to display the information. It looks like a TV.
- **Printer-** It is used to print the information on papers.
- **Plotter-** It is used to produce graphical output on papers.

5. Differentiate optical and Laser mouse

Optical Mouse

- ✓ Measures the motion and acceleration of pointer.
- ✓ It uses light source instead of ball to judge the motion of the pointer.
- ✓ Optical mouse is less sensitive towards surface.

Laser Mouse

- ✓ Measures the motion and acceleration of pointer.
- ✓ Laser Mouse uses Laser Light
- ✓ Laser Mouse is highly sensitive and able to work on any hard surface.

6. Write short note on impact printer.

These printers print with striking of hammers or pins on ribbon. These printers can print on multi-part (using carbon papers) by using mechanical pressure.

Example

Dot Matrix printers and Line matrix printers.

7. Write the characteristics of sixth generation.

- In the Sixth Generation, computers could be defined as the era of intelligent computers, based on Artificial Neural Networks.
- One of the most dramatic changes in the sixth generation will be the explosive growth of Wide Area Networking.
- Natural Language Processing (NLP) is a component of Artificial Intelligence (AI).
- It provides the ability to develop the computer program to understand human language.

8. Write the significant features of monitor.

- Pictures on a monitor are formed with picture elements called PIXELS.
- Monitors may either be Monochrome which display text or images in Black and White or can be color, which display results in multiple colors.
- There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).
- The monitor works with the VGA (Video Graphics Array) card.

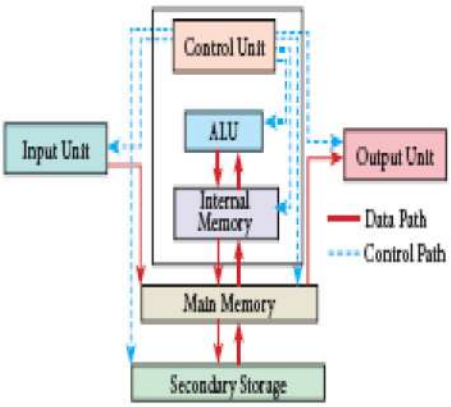
PART - IV

Explain in detail

1. Explain the basic components of a computer with a neat diagram.

Input Unit

Input unit is used to feed any form of data to the computer, which can be stored in the memory unit for further processing. Example: Keyboard, mouse, etc.



Central Processing Unit

CPU is the major component which interprets and executes software instructions. It also controls the operation of all other components such as memory, input and output units.

The CPU has three components which are *Control unit, Arithmetic and logic unit (ALU) and Memory unit*.

Arithmetic and Logic Unit

The ALU is a part of the CPU where various computing functions are performed on data. The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations. The result of an operation is stored in internal memory of CPU. The logical operations of ALU promote the decision-making ability of a computer.

Control Unit

The control unit controls the flow of data between the CPU, memory and I/O devices. It also controls the entire operation of a computer.

Output Unit

An Output Unit is any hardware component that conveys information to users in an understandable form. Example: Monitor, Printer etc.

Memory Unit

The Memory Unit is of two types which are primary memory and secondary memory.

- The primary memory is used to temporarily store the programs and data when the instructions are ready to execute.
- The secondary memory is used to store the data permanently.

3. Explain the following

a. Inkjet Printer

Inkjet Printers use colour cartridges which combined Magenta, Yellow and Cyan inks to create color tones. A black cartridge is also used for monochrome output. Inkjet printers work by spraying ionised ink at a sheet of paper. The speed of Inkjet printers generaly range from 1-20 PPM (Page Per Minute)

b. Multimedia projector

Multimedia projectors are used to produce computer output on a big screen. These are used to display presentations in meeting halls or in classrooms.

c. Bar code / QR code Reader

- A Bar code is a pattern printed in lines of different thickness. The Bar code reader scans the information on the bar codes transmits to the Computer for further processing. The system gives fast and error free entry of information into the computer.
- QR (Quick response) Code: The QR code is the two dimension bar code which can be read by a camera and processed to interpert the image

2. Discuss the various generations of computers.

SN	Generation	Period	Main Component used	Merits/Demerits
1	First Generation	1942-1955	 Vacuum tubes	• Big in size • Consumed more power • Malfunction due to overheat • Machine Language was used
First Generation Computers - ENIAC , EDVAC , UNIVAC 1 ENIAC weighed about 27 tons, size 8 feet × 100 feet × 3 feet and consumed around 150 watts of power				
2	Second Generation	1955-1964	 Transistors	• Smaller compared to First Generation • Generated Less Heat • Consumed less power compared to first generation • Punched cards were used • First operating system was developed - Batch Processing and Multiprogramming Operating System • Machine language as well as Assembly language was used.
Second Generation Computers IBM 1401, IBM 1620, UNIVAC 1108				
3	Third Generation	1964 -1975	 Integrated Circuits (IC)	• Computers were smaller, faster and more reliable • Consumed less power • High Level Languages were used
Third Generation Computers IBM 360 series, Honeywell 6000 series				
4	Fourth Generation	1975-1980	 Microprocessor Very Large Scale Integrated Circuits (VLSI)	• Smaller and Faster • Microcomputer series such as IBM and APPLE were developed • Portable Computers were introduced.
5	Fifth Generation	1980 - till date	 Ultra Large Scale Integration (ULSI)	• Parallel Processing • Super conductors • Computers size was drastically reduced. • Can recognize Images and Graphics • Introduction of Artificial Intelligence and Expert Systems • Able to solve high complex problems including decision making and logical reasoning
6	Sixth Generation	In future		• Parallel and Distributed computing • Computers have become smarter, faster and smaller • Development of robotics • Natural Language Processing • Development of Voice Recognition Software

NUMBER SYSTEMS | CHAPTER 2

PART - I

I Choose the best answer

1. Which refers to the number of bits processed by a computer's CPU?
   A) Byte B) Nibble **C) Word length** D) Bit
2. How many bytes does 1 KiloByte contain?
   A) 1000 B) 8 C) 4 **D) 1024**
3. Expansion for ASCII
   A) American School Code for Information Interchange
   B) American Standard Code for Information Interchange
   C) All Standard Code for Information Interchange
   D) American Society Code for Information Interchange
4. 2^50 is referred as
   A) Kilo B) Tera **C) Peta** D) Zetta
5. How many characters can be handled in Binary Coded Decimal System?
   A) 64 B) 255 C) 256 D) 128
6. For 1101_2 what is the Hexadecimal equivalent?
   A) F B) E **C) D** D) B
7. What is the 1's complement of 00100110?
   A) 00100110 **B) 11011001** C) 11010001 D) 00101001
8. Which amongst this is not an Octal number?
   A) 645 B) 234 **C) 876** D) 123

PART - II

1. What is data?

The term data comes from the word **datum**, which means a raw fact. The data is a fact about people, places or some objects.

2. Write the 1's complement procedure.

- Convert given Decimal number into Binary
- Check if the binary number contains 8 bits , if less add 0 at the left most bit, to make it as 8 bits.
- Invert all bits (i.e. Change 1 as 0 and 0 as 1)

3. Convert $(46)_{10}$ into Binary number

2	46	
2	23	- 0 LSB
2	11	- 1
2	5	- 1
2	2	- 1
	MSB 1	- 0

$(46)_{10} = (101110)_2$

4. We cannot find 1's complement for $(28)_{10}$. State reason.

Reason : We cannot find 1's complement for $(28)_{10}$. Because it is a positive number. 1's complement apply only with negative number.

5. List the encoding systems for characters in memory.

- BCD – Binary Coded Decimal
- EBCDIC – Extended Binary Coded Decimal Interchange Code
- ASCII – American Standard Code for Information Interchange
- Unicode
- ISCII - Indian Standard Code for Information Interchange

PART - III

1. What is radix of a number system? Give example

Binary Number System	- Radix 2	$(1010)_2$
Octal Number System	- Radix 8	$(457)_8$
Decimal Number System	- Radix 10	$(312)_{10}$
Hexadecimal Number System	- Radix 16	$(25F)_{16}$

2. Write note on binary number system.

There are only two digits in the Binary system, namely, 0 and 1. The numbers in the binary system are represented to the base 2 and the positional multipliers are the powers of 2.

- The left most bit is the **M**ost **S**ignificant **B**it (MSB) and it has the largest positional weight.
- The right most bit is the **L**east **S**ignificant **B**it (LSB) and has the smallest positional weight.

3. Convert $(150)_{10}$ into Binary, then convert that Binary number to Octal.

Decimal to binary

2	150	Bi
2	75	- 0
2	37	- 1
2	18	- 1
2	9	- 0
2	4	- 1
2	2	- 0
MSB	1	- 0

$(150)_{10} = (10010110)_2$

Binary Number to Octal

10010110 =?

$\frac{010}{2}$ $\frac{010}{2}$ $\frac{110}{6}$

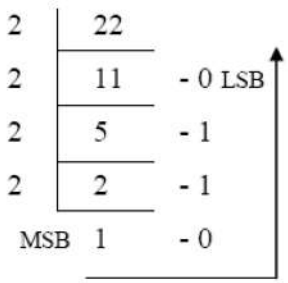
$(10010110)_2 = (226)_8$

4. Write short note on ISCII.

ISCII is the system of handling the character of Indian local languages. This as a 8-bit coding system. Therefore it can handle 256 (2^8) characters. This system is formulated by the department of Electronics in India in the year 1986 - 88 and recognized by Bureau of Indian Standards (BIS).

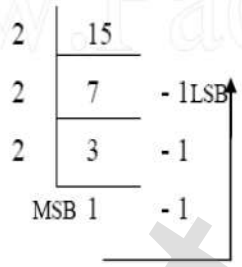
5. Add

A) $-22_{10}+15_{10}$



The Binary equivalent of $22_{10} = (10110)_2$

8 bit format	00010110
1's complement	11101001
Add 1 bit	1
2's complement −22	11101010



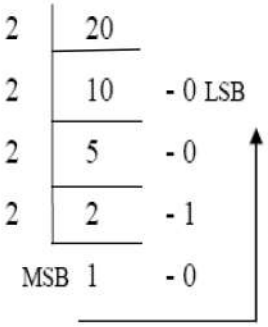
The Binary equivalent of $15_{10} = (1111)_2$

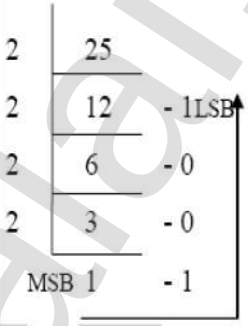
The binary addition of −22 and 15

-22_{10}	11101010
$+15_{10}$	00001111
	11111001

ANS = $(11111001)_2$

B) $20_{10}+25_{10}$





$(20)_2$	00010100
$(25)_2$	00011001
	00101101

$45_{10} = (00101101)_2$

PART - IV

1. A) Write the procedure to convert fractional Decimal to Binary.

- Multiply the decimal fraction by 2 and note the integer part. The integer part is either 0 or 1.
- Discard the integer part of the previous product. Multiply the fractional part of the previous product by 2. Repeat Step 1 until the same fraction repeats or terminates (0).
- The resulting integer part forms a sequence of 0s and 1s that become the binary equivalent of decimal fraction.
- The final answer is to be written from first integer part obtained till the last integer part obtained.

B) Convert $(98.46)_{10}$ to Binary

i) Integer Part

2	98	
2	49	- 0 LSB
2	24	- 1
2	12	- 0
2	6	- 0
2	3	- 0
MSB 1		- 1

$98_{10} = (1100010)_2$

ii) Fractional Part

$0.46 \times 2 = 0.92 = 0$
$0.92 \times 2 = 1.84 = 1$
$0.84 \times 2 = 1.68 = 1$
$0.68 \times 2 = 1.36 = 1$
$0.36 \times 2 = 0.72 = 0$
$0.72 \times 2 = 1.44 = 1$
$0.44 \times 2 = 0.88 = 0$

$46_{10} = (0111010)_2$

$(98.46)_{10} = (1100010.\ 0111010....)_2$

2. Find 1's Complement and 2's Complement for the following Decimal number

A) -98

2	98	
2	49	- 0 LSB
2	24	- 1
2	12	- 0
2	6	- 0
2	3	- 0
MSB 1		- 1

8 bit format of +98	01100010
1's complement	10011101
Add 1 bit	1
2's complement	10011110

$-98 = (10011110)_2$

B) -135

2	135	
2	67	- 1 LSB
2	33	- 1
2	16	- 1
2	8	- 0
2	4	- 0
2	2	- 0
MSB 1		- 0

8 bit format of +135	10000111
1's complement	01111000
Add 1 bit	1
2's complement	01111001

$-135 = (01111001)_2$

3. A) Add $1101010_2 + 101101_2$

```
  1 1
  1 1 0 1 0 1 0
+   1 0 1 1 0 1
-------------------
1 0 0 1 0 1 1 1
```

$1101010_2 + 101101_2 =$ **10010111_2**

B) Subtract $1101011_2 - 111010_2$

```
    1   10
  ✗ ✗ 0 1 0 1 1
- 1 1 1 0 1 0
-------------------
  0 1 1 0 0 0 1
```

$1101011_2 - 111010_2 =$ **0110001_2**

Boolean Algebra

PART – I

1. Which is a basic electronic circuit which operates on one or more signals?
   A) Boolean algebra **B) Gate** C) Fundamental gates D) Derived gates
2. Which gate is called as the logical inverter?
   A) AND B) OR **C) NOT** D) XNOR
3. A + A = ?
   A) A B) O C) 1 D) A'
4. NOR is a combination of ?
   A) NOT(OR) B)NOT(AND) C) NOT(NOT) D) NOT(NOR)
5. NAND is called as ..... Gate
   A) Fundamental Gate B) Derived Gate C) Logical Gate **D) Universal gate**

PART – II

1. What is Boolean Algebra?

Boolean algebra is a mathematical discipline that is used for designing digital circuits in a digital computer. It describes the relation between inputs and outputs of a digital circuit.

2. Write a short note on NAND Gate.

- The NAND gate operates an AND gate followed by a NOT gate.
- The output is "false" if both inputs are "true", otherwise, the output is "true".

3. Draw the truth table for XOR gate.

INPUT		OUTPUT
A	**B**	**C**
0	0	0
0	1	1
1	0	1
1	1	0

4. Write the associative laws?

A + (B + C) = (A + B) + C

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

5. What are derived gates?

NAND, NOR, XOR and XNOR are derived gates which are derived from the fundamental gates.

Part – III

2. Write a short note on XNOR gate.

The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter. Its output is "true" if the inputs are the same, and "false" if the inputs are different.

The logic circuit of XNOR gate is

Fig. 2.18 Logic Symbol of XNOR Gate

The truth table for XNOR

INPUT		OUTPUT
A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

1. Write the truth table of fundamental gates.

LOGIC GATES	INPUT		OUTPUT
	A	B	C
AND	0	0	0
	0	1	0
	1	0	0
	1	1	1
	A	B	C
OR	0	0	0
	0	1	1
	1	0	1
	1	1	1
	A		A′
NOT	0		1
	1		0

3. Reason out why the NAND an NOR are called universal gates?

NAND and NOR gates are called Universal gates, because all fundamental logic gates can be realized through them.

4. Give the truth table of XOR gate.

INPUT		OUTPUT
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

5. Write the De Morgan's law.

$$\overline{A + B} = \overline{A} \cdot \overline{B}$$
$$\overline{(A \cdot B)} = \overline{A} + \overline{B}$$

PART – IV

1. Explain the fundamental gates with expression and truth table.

AND

The AND gate can have two or more input signals and produce an output signal. The output is "true" only when both inputs are "true", otherwise, the output is "false".

Boolean function

$$C = A \cdot B$$

Logical symbol

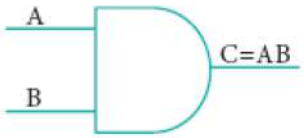


Fig. 2.4 Logic symbol of AND Gate

Truth table

INPUT		OUTPUT
A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

OR

The OR gate gets its name from its behaviour like the logical inclusive "OR". The output is "true" if either or both of the inputs are "true".

Boolean function

$$C = A + B$$

Logical symbol

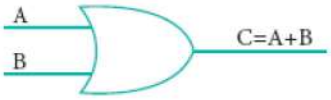


Fig. 2.5 Logic symbol of OR Gate

Truth table

INPUT		OUTPUT
A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

NOT

The NOT gate, called a logical inverter, has only one input. It reverses the logical state.

Boolean function

$$C = \overline{A}$$

Logical symbol

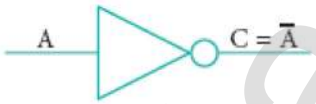


Fig. 2.6 Logic symbol of NOT Gate

Truth table

A	C=A′
0	1
1	0

2. How AND and OR can be realized using NAND and NOR gate.

NAND

The NAND gate operates an AND gate followed by a NOT gate. It acts in the manner of the logical operation "AND" followed by inversion. The output is "false" if both inputs are "true", otherwise, the output is "true".

Boolean function

$$C = \overline{(A \cdot B)}$$

Logical symbol

Truth table

INPUT		OUTPUT
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

NOR

The NOR gate circuit is an OR gate followed by an inverter. Its output is "true" if both inputs are "false" Otherwise, the output is "false".

Boolean function

$C = \overline{(A + B)}$

Logical symbol

Truth table

INPUT		OUTPUT
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

3. Explain the Derived gates with expression and truth table.

NAND

The NAND gate operates an AND gate followed by a NOT gate. It acts in the manner of the logical operation "AND" followed by inversion. The output is "false" if both inputs are "true", otherwise, the output is "true".

Boolean function

$C = \overline{(A \cdot B)}$

Logical symbol

Truth table

INPUT		OUTPUT
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

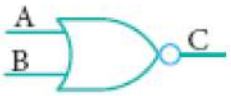
NOR

The NOR gate circuit is an OR gate followed by an inverter. Its output is "true" if both inputs are "false" Otherwise, the output is "false".

Boolean function

$C = \overline{(A + B)}$

Logical symbol



Truth table

INPUT		OUTPUT
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

XOR

The XOR (exclusive - OR) gate acts in 1 the same way as the logical "either/or." The output is "true" if either, but not both, of the inputs are "true". The output is "false" if both inputs are "false" or if both inputs are "true."

Boolean function

$$C = (A \oplus B)$$

Logical symbol

Truth table

INPUT		OUTPUT
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

XNOR

The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter. Its output is "true" if the inputs are the same, and "false" if the inputs are different.

Boolean function

$$C = A \odot B$$

Logical symbol

Truth table

INPUT		OUTPUT
A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

COMPUTER ORGANIZATION | CHAPTER 3

PART - I

Choose the correct answer

1. Which of the following is said to be the brain of a computer?
   A) Input devices B) Output devices
   C) Memory device **D) Microprocessor**
2. Which of the following is not the part of a microprocessor unit?
   A) ALU B) Control unit **C) Cache memory** D) register
3. How many bits constitute a word?
   A) 8 B) 16 C) 32 D) **determined by the processor used**
4. Which of the following device identifies the location when address is placed in the memory address register?
   A) Locator B) encoder **C) decoder** D) multiplexer
5. Which of the following is a CISC processor?
   A) Intel P6 B) AMD K6 **C) Pentium III** D) Pentium IV
6. Which is the fastest memory?
   A) Hard disk B) Main memory **C) Cache memory** D) Blue-Ray disc
7. How many memory locations are identified by a processor with 8 bits address bus at a time?
   A) 28 B) 1024 **C) 256** D) 8000
8. What is the capacity of 12cm diameter DVD with single sided and single layer?
   A) 4.7 GB B) 5.5 GB C) 7.8GB D) 2.2 GB
9. What is the smallest size of data represented in a CD?
   A) blocks B) sectors **C) pits** D) tracks
10. Display devices are connected to the computer through.
    A) USB port B) Ps/2 port C) SCSI port **D) VGA connector**

PART - II

1. What are the parameters which influence the characteristics of a microprocessor?

- Clock speed
- Instruction set
- Word size

2. What is an instruction?

A command which is given to a computer to perform an operation on data is called an instruction.

3. What is a program counter?

The Program Counter (PC) is a special register in the CPU which always keeps the address of the next instruction to be executed.

4. What is HDMI?

High-Definition Multimedia Interface is an audio/video interface which transfers the uncompressed video and audio data from a video controller, to a compatible computer monitor, LCD projector, digital television etc.

5. Which source is used to erase the content of a EPROM?

Ultraviolet rays are used to erase the content of a EPROM.

PART - III

1. Differentiate Computer Organization from Computer Architecture.

Computer organization

- Computer organization deals with the hardware components of a computer system. It includes Input / Output devices, the Central Processing Unit, storage devices and primary memory.
- Its deals with the hardware components that are transparent to the programmer.

Computer Architecture

- Computer Architecture also deals with how they are interconnected to implement an architectural specification.
- Its deals with the engineering considerations involved in designing a computer.

2. Classify the microprocessor based on the size of the data.

The microprocessors can be classified as follows.

- 8-bit microprocessor
- 16-bit microprocessor
- 32-bit microprocessor
- 64-bit microprocessor

3. Write down the classifications of microprocessors based on the instruction set.

Reduced Instruction Set Computers (RICS)

They have a small set of highly optimized instructions. Complex instructions are also implemented using simple instructions, thus reducing the size of the instruction set.

Examples

Pentium IV, Intel P6, AMD K6 and K7.

Complex Instruction Set Computers (CISC**)**

They support hundreds of instructions. Computers supporting CISC can accomplish a wide variety of tasks, making them ideal for personal computers.

Examples

Intel 386 & 486, Pentium, Pentium II and III, and Motorola 68000.

4. Differentiate PROM and EPROM.

PROM

- It is a non-volatile memory on which data can be written only once.
- Once a program has been written onto a PROM, it remains there forever.
- PROMs retain their contents even when the computer is turned off.

EPROM

- It is a special type of memory which serves as a PROM, but the content can be erased using ultraviolet rays.
- EPROM retains its contents until it is exposed to ultraviolet light.

5. Write down the interfaces and ports available in a computer.

Serial Port: To connect the external devices, found in old computers.

Parallel Port: To connect the printers, found in old computers.

USB Ports: To connect external devices like cameras, scanners, mobile phones, external hard disks and printers to the computer.

VGA Connector: To connect a monitor or any display device like LCD projector.

Audio Plugs: To connect sound speakers, microphone and headphones.

PS/2 Port: To connect mouse and keyboard to PC.

SCSI Port: To connect the hard disk drives and network connectors.

6. Differentiate CD and DVD

CD

- CD stands for Compact Disk
- CD data is represented as tiny indentations known as "pits"
- The capacity of an ordinary CD-ROM is 700MB.
- A CD is made from 1.2 millimeters thick, polycarbonate plastic material.

DVD

- DVD stands for Digital Versatile Disc
- DVD-ROM can be visually determined by noting the number of data sides of the disc.
- The capacity of DVD is 4.7 GB.
- A DVD is made from 12 cm diameter disc with single sided, single layer has 4.7 GB capacity.

7. How will you differentiate a flash memory and an EEPROM?

Flash Memory

- Flash memory is electronic (solid-state) nonvolatile computer storage.
- Flash memory offers fast access times.
- It can be erased by exposing it to an electrical charge.

EEPROM

- Electrically Erasable Programmable Read Only Memory is a special type of PROM.
- EEPROM is slower in performance.
- It can be electrically erased and reprogrammed.

PART - IV

1. Explain the characteristics of a microprocessor.

A Microprocessor's performance depends on the following characteristics:

- Clock speed
- Instruction set
- Word size

Clock speed

Every microprocessor has an internal clock that regulates the speed at which it executes instructions. The speed at which the microprocessor executes instructions is called the clock speed. Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

Instruction Set

A command which is given to a computer to perform an operation on data is called an instruction. Basic set of machine level instructions that a microprocessor is designed to execute is called as an instruction set.

This instruction set carries out the following types of operations:

- Data transfer
- Arithmetic operations
- Logical operations
- Control flow
- Input/output

Word Size

The number of bits that can be processed by a processor in a single instruction is called its word size. Word size determines the amount of RAM that can be accessed by a

microprocessor at one time and the total number of pins on the microprocessor. Total number of input and output pins in turn determines the architecture of the microprocessor.

2. How the read and write operations are performed by a processor? Explain.

The read operation fetches data from memory and transfers to MDR. A single control line performs two operations like Read/Write using 1or 0. Also, the write operation transfers data from the MDR to memory.

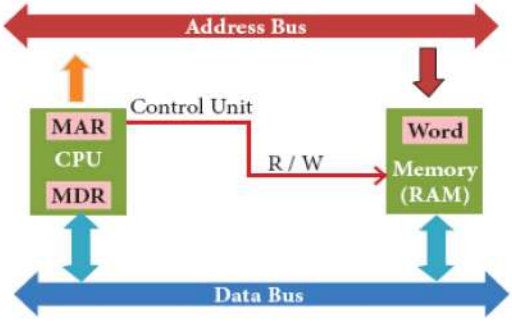


Figure 3.3 Bus connectivity between CPU and Memory

The word in the RAM has the same size (no. of bits) as the Memory Data Register (MDR). If the processor is an 8-bit processor like Intel 8085, its MDR and the word in the RAM both have 8 bits. If the size of the MDR is eight bits, which can be connected with a word in the memory which is also eight bits size. The data bus has eight parallel wires to transfer data either from MDR to word or word to MDR based on the control(Read or write). This control line is labeled as R/W, which becomes 1 means READ operation and 0 means WRITE operation.

The read operation transfers the data(bits) from word to memory data register. The write operation transfers the data(bits) from memory data register to word.

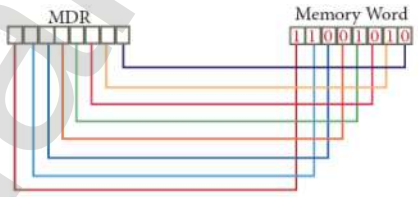


Figure 3.4 Before the read operation

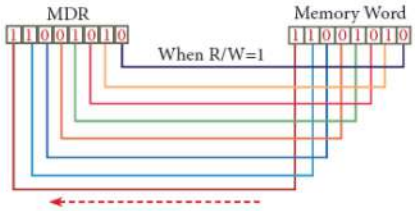


Figure 3.5 After the read operation

3. Arrange the memory devices in ascending order based on the access time.

Blu-Ray Disc

Blu-Ray Disc is a high-density optical disc similar to DVD. Blu-ray is the type of disc used for PlayStation games and for playing High-Definition (HD) movies. A double-layer Blu-Ray disc can store up to 50GB (gigabytes) of data.

This is more than 5 times the capacity of a DVD, and above 70 times of a CD. The format was developed to enable recording, rewriting and playback of high-definition video, as well as storing large amount of data.

Hard Disks

Hard disk is a magnetic disk on which you can store data. The hard disk has the stacked arrangement of disks accessed by a pair of heads for each of the disks. The hard disks come with a single or double sided disk.Hence, it is called as Blu-Ray.

Random-Access Memory (RAM)

The main memory is otherwise called as Random Access Memory. This is available in computers in the form of Integrated Circuits (ICs). The smallest unit of information that can be stored in the memory is called as a bit. The memory can be accessed by a collection of 8 bits which is called as a byte.

Cache Memory

The cache memory is a very high speed and expensive memory, which is used to speed up the memory retrieval process. Due to its higher cost, the CPU comes with a smaller size of cache memory compared with the size of the main memory. Without cache memory, every time the CPU requests the data, it has to be fetched from the main memory which will consume more time.

4. Explain the types of ROM.

Read Only Memory (ROM)

Read only memory refers to special memory in a computer with pre-recorded data at manufacturing time which cannot be modified. The stored programs that start the computer and perform diagnostics are available in ROMs.

Programmable Read Only Memory (PROM)

Programmable read only memory is also a non-volatile memory on which data can be written only once. Once aprogram has been written onto a PROM, it remains there forever. Unlike the main memory, PROMs retain their contents even when the computer is turned off.

The PROM differs from ROM. PROM is manufactured as a blank memory, whereas a ROM is programmed during the manufacturing process itself.

Erasable Programmable Read Only Memory (EPROM)

Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM, but the content can be erased using ultraviolet rays. EPROM retains its contents until it is exposed to ultraviolet light. The ultraviolet light clears its contents, making it possible to reprogram the memory.

An EPROM differs from a PROM, PROM can be written only once and cannot be erased.

Electrically Erasable Programmable Read Only Memory (EEPROM)

Electrically Erasable Programmable Read Only Memory is a special type of PROM that can be erased by exposing it to an electrical charge. Like other types of PROM, EEPROM retains its contents even when the power is turned off. Comparing with all other types of ROM, EEPROM is slower in performance.

OPERATING SYSTEMS CHAPTER 4

PART - I

Choose the Best Answer

1) Operating system is a
A) Application Software B) Hardware **C) System Software** D) Component

2) Identify the usage of Operating Systems
A) Easy interaction between the human and computer
B) Controlling input & output Devices
C) Managing use of main memory
D) All the above

3) Which of the following is not a function of an Operating System?
A) Process Management B) Memory Management
C) Security management **D) Complier Environment**

4) Which of the following OS is a commercially licensed Operating system?
A) Windows B) UBUNTU C) FEDORA D) REDHAT

5) Which of the following Operating systems support Mobile Devices?
A) Windows 7 B) Linux C) BOSS **D) iOS**

6) File Management manages
A) Files B) Folders C) Directory systems **D) All the Above**

7) Interactive Operating System provides
A) Graphics User Interface (GUI) B) Data Distribution
C) Security Management D) Real Time Processing

8) An example for single task operating system is
A) Linux B) Windows **C)MS-DOS** D) Unix

9) The File management system used by Linux is
A) ext2 B) NTFS C) FAT D) NFTS

PART - II

1. List out any two uses of Operating System?

- Controlling Input and Output Devices
- Manage the utilisation of main memory

2. What is the multi-user Operating system?

It is used in computers and laptops that allow same data and applications to be accessed by multiple users at the same time. The users can also communicate with each other.

Examples

Windows, Linux and UNIX

3. What is a GUI?

The GUI is a window based system with a pointing device to direct I/O, choose from menus, make selections and a keyboard to enter text. Its vibrant colours attract the user very easily.

4. What are the security management features available in Operating System?

- ✓ File access level,
- ✓ System level,
- ✓ Network level

5. What is multi-processing?

It has two or more processors for a single running process (joB). Processing takes place in parallel is known as parallel processing. Each processor works on different parts of the same task or on two or more different tasks.

6. What are the different Operating Systems used in computer?

The different Operating Systems used in computer are:

- Single User Operating Systems
- Multi-user Operating Systems
- Distributed Operating Systems

PART - III

1. What are the advantages and disadvantages of Time-sharing features?

Advantages

- In time sharing systems all the tasks are given specific time and task switching time is very less so applications don't get interrupted by it.
- Many applications can run at the same time. You can also use time sharing in batch systems if appropriate which increases performance.
- Provides the advantage of quick response, Avoids duplication of software, Reduces CPU idle time.

Disadvantages

- The big disadvantage of time sharing systems is that it consumes much resource so it needs special operating systems.
- Switching between tasks becomes sometimes sophisticated as there are lot of users and applications running which may hang up the system
- Problem of reliability, Question of security and integrity of user programs and data, Problem of data communication

2. List out the key features of Operating system.

- User interface
- File Management
- Memory Management
- Process Management
- Fault tolerance
- Security Management

3. Write a note on Multiprocessing.

- Multiprocessing is a one of the features of Operating System.
- It has two or more processors for a single running process (job).
- Processing takes place in parallel is known as parallel processing.
- Since the execution takes place in parallel, this feature is used for high speed execution which increases the power of computing.

PART - IV

1. Explain the concept of a Distributed Operating System along with its advantages.

This feature takes care of the data and application that are stored and processed on multiple physical locations across the world over the digital network (internet/intranet).

The Distributed Operating System is used to access shared data and files that reside in any machine around the world. The user can handle the data from different locations. The users can access as if it is available on their own computer.

Advantages

- A user at one location can make use of all the resources available at another location over the network.
- Many computer resources can be added easily in the network
- Improves the interaction with the customers and clients.
- Reduces the load on the host computer.

2. List out the points to be noted while creating a user interface for an Operating system.

1. The user interface should enable the user to retain this expertise for a longer time.
2. The user interface should also satisfy the customer based on their needs.
3. The user interface should save user's precious time.
4. The ultimate aim of any product is to satisfy the customer. The User Interface is also to satisfy the customer.
5. The user interface should reduce number of errors committed by the user

3. Explain the process management algorithms in Operating System.

Process management is function that includes creating and deleting processes and providing mechanisms for processes to communicate and synchronize with each other.

The following algorithms are mainly used to allocate the job (process) to the processor.

1. FIFO 2. SJF 3. Round Robin 4. Based on Priority

FIFO (First In First Out) Scheduling:

This algorithm is based on queuing technique. Assume that a student is standing in a queue (Row) to get grade sheet from his/her teacher. The other student who stands first in the queue gets his/her grade sheet first and leaves from the queue (Row). Followed by the next student in the queue gets it corrected and so on.

SJF (Shortest Job First) Scheduling:

This algorithm works based on the size of the job being executed by the CPU. Consider two jobs A and B.

1) A = 6 kilo bytes 2) B = 9 kilo bytes

First the job "A" will be assigned and then job "B" gets its turn.

Round Robin Scheduling

The Round Robin (RR) scheduling algorithm is designed especially for time sharing systems. Jobs (processes) are assigned and processor time in a circular method. For example take three jobs A, B, C. First the job A is assigned to CPU then job B and job C and then again A, B and C and so on.

Based On Priority

The given job (process) is assigned based on a Priority. The job which has higher priority is more important than other jobs. Take two jobs A and B. Let the priority of A be 5 and priority B be 7 Job B is assigned to the processor before job A.

WORKING WITH TYPICAL OPERATING SYSTEM

CHAPTER 5

PART - I

Choose the Best Answer

1. From the options given below, choose the operations managed by the operating system.

A) Memory B) Processes C) Disks and I/O devices **D) all of the above**

2. Which is the default folder for many Windows Applications to save your file?

A) My Document B) My Pictures C) Documents and Settings D) My Computer

3. Under which of the following OS, the option Shift + Delete – permanently deletes a file or folder?

A) Windows 7 B) Windows 8 C) Windows10 **D) all the above**

4. What is the meaning of "Hibernate" in Windows XP/Windows 7?

A) Restart the Computer in safe mode

B) Restart the Computer in hibernate mode

C) Shutdown the Computer terminating all the running applications

D) Shutdown the Computer without closing the running applications

5. The shortcut key used to rename a file in windows

a) F2 b) F4 c) F5 d) F6

PART - II

1. What is known as Multitasking?

Multiple applications can execute simultaneously in Windows, and this is known as "Multitasking".

2. What are called standard icons?

The icons which are available on desktop by default while installing Windows OS are called standard icons.

3. Differentiate Files and Folders.

Files - *File* is a collection of related data or information that is created by Application.

Folders - *Folder* is a way to organize files into groups and put them under a common name.

4. Differentiate Save and save As option.

- ***Save*** option used to save a new document with name.
- ***Save As*** option used to save an already existing document with a new name and also create a copy of already existing document with new name obviously.

5. How will you Rename a File?

(i) Select the File or Folder you wish to Rename.
(ii) Click File→ Rename.
(iii) Type in the new name.
(iv) To finalise the renaming operation, press Enter.

PART – III

1. What are the functions of Windows Operating system?

- Access applications (programs) on the computer (word processing, games, spread sheets, calculators and so on).
- Load any new program on the computer.
- Manage hardware such as printers, scanners, mouse, digital cameras etc.,

- File management activities (For example creating, modifying, saving, deleting files and folders).
- Change computer settings such as colour scheme, screen savers of your monitor, etc.

2. Write a note on Recycle bin.

Recycle bin is a special folder to keep the files or folders deleted by the user, which means you still have an opportunity to recover them.

The user cannot access the files or folders available in the Recycle bin without restoring it.

3. Write a note on the elements of a window.

Title Bar - The title bar will display the name of the application and the name of the document opened.

Menu Bar - Menus in the menu bar can be accessed by pressing Alt key and the letter that appears underlined in the menu title.

Workspace - The workspace is the area in the document window to enter or type the text of your document.

Scroll bars - The scroll bars are used to scroll the workspace horizontally or vertically.

Corners and borders - The corners and borders of the window helps to drag and resize the windows.

4. Write the two ways to create a new folder.

Method I:

Step 1: Open Computer Icon.
Step 2: Open any drive where you want to create a new folder. (For example select D:)
Step 3: Click on File → New → Folder.
Step 4: A new folder is created with the default name "New folder".
Step 5: Type in the folder name and press Enter key.

Method II:

In order to create a folder in the desktop:
Step 1: In the Desktop, right click → New → Folder.
Step 2: A Folder appears with the default name "New folder" and it will be highlighted.
Step 3: Type the name you want and press Enter Key.
Step 4: The name of the folder will change.

5. Differentiate copy and move.

Copy	Move
It means to make a duplicate copy of a file.	It means to transfer a file from one location to another.
It use the **copy and paste** option.	It use the **copy and paste** option.
The original file remains at the source location.	The original file is moved to the destination location.

PART - IV

1. Explain the versions of Windows Operating System.

Windows 95		1995	• Introduced Start button, the taskbar, Windows Explorer and Start menu. • Introduced 32 - bit processor and focused more on multitasking.
Windows 98		1998	• Integration of the Web browser (Internet Explorer) with the Operating System. • DOS gaming began to disappear as Windows based games improved. • Plug and play feature was introduced.
Windows NT			• Designed to act as servers in network.
Windows Me		2000	• It introduced automated system diagnostics and recovery tools.
Windows 2000		2000	• Served as an Operating System for business desktop and laptop systems. • Four versions of Windows 2000 were released: Professional (for business desktop and laptop systems), Server (both a Web server and an office server), Advanced Server (for line-of-business applications) and Data Centre Server (for high-traffic computer networks).
Windows XP		2001	• Introduced 64-bit Processor. • Improved Windows appearance with themes and offered a stable version.
Windows Vista		2006	• Updated the look and feel of Windows.

Windows 7		2009	• Booting time was improved, introduced new user interfaces like Aero Peek, pinning programs to taskbar, handwriting recognition etc. and Internet Explorer 8.
Windows 8		2012	• Windows 8 was faster than previous versions of Windows. • Start button was removed. • Windows 8 takes better advantage of multi-core processing, solid state drives (SSD), touch screens and other alternate input methods. • Served as common platform for mobile and computer.
Windows 10		2015	• Start Button was added again. • Multiple desktop. • Central Notification Center for App notification and quick actions. • Cortana voice activated personal assistant.

2. Explain the different ways of finding a file or Folder.

You can use the ***search box on the Start menu*** to quickly search a particular folder or file in the computer or in a specific drive.

1. Click the Start button, the search box appears at the bottom of the start menu.
2. Type the name of the file or the folder you want to search. Even if you give the part of the file or folder name, it will display the list of files or folders starting with the specified name.
3. The files or the folders with the specified names will appear, if you click that file, it will directly open that file or the folder.
4. There is another option called "See more results" which appears above the search box.
5. If you click it, it will lead you to a Search Results dialog box where you can click and open that file or the folder.

Searching Files or folders using Computer icon

1. Click Computer Icon from desktop or from Start menu.
2. The Computer disk drive screen will appear and at the top right corner of that screen, there is a search box option.
3. Type the name of the file or the folder you want to search. Even if you give the part of the file or folder name, it will display the list of files or folders starting with the specified name.
4. Just click and open that file or the folder.

3. Write the procedure to create shortcut in Windows OS.

- Select the file or folder that you wish to have as a shortcut on the Desktop.
- Right click on the file or folder.
- Select Send to from the shortcut menu, then select Desktop (create shortcut) from the sub-menu.
- A shortcut for the file or folder will now appear on your desktop and you can open it from the desktop in the same way as any other icon.

Specification and Abstraction | CHAPTER 6

PART - I

I Choose the Best Answer

1. Which of the following activities is algorithmic in nature?
   A) Assemble a bicycle. B) Describe a bicycle.
   C) Label the parts of a bicycle. D) Explain how a bicycle works.
2. Which of the following activities is not algorithmic in nature?
   A) Multiply two numbers. B) Draw a kolam.
   C) Walk in the park. **(d) Swaping of two numbers.**
3. Omitting details inessential to the task and representing only the essential features of the task is known as
   A) specification **B) abstraction** C) composition D) decomposition
4. Stating the input property and the input-output relation a problem is known
   A) specification B) statement C) algorithm D) definition
5. Ensuring the input-output relation is
   A) the responsibility of the algorithm and the right of the user.
   B) the responsibility of the user and the right of the algorithm.
   C) the responsibility of the algorithm but not the right of the user.
   D) the responsibility of both the user and the algorithm.
6. If i = 5 before the assignment i := i-1 after the assignment, the value of i is
   A) 5 **B) 4** C) 3 D) 2
7. If 0 < i before the assignment i := i-1 after the assignment, we can conclude that
   A) 0 < i B) **0 ≤ i** C) i = 0 D) 0 ≥i

PART - II

1. Define an algorithm.

- An algorithm is a step-by-step sequence of statements to solve a problem.
- An algorithm is a sequence of instructions to accomplish a task or solve a problem.

2. Distinguish between an algorithm and a process.

Algorithm	Process
As an algorithm is executed, a process evolves which solves the problem.	When the instructions are executed, a process evolves which accomplishes the intended task or solves the given problem.

3. Initially, farmer, goat, grass, wolf = L, L, L, L and the farmer crosses the river with goat. Model the action with an assignment statement.

1. -- farmer, goat, grass, wolf = L, L, L, L
2. **farmer, goat := R, R**
3. -- farmer , goat , grass , wolf = R, R, L, L

4. Specify a function to find the minimum of two numbers.

minimum(a,B)
-- inputs: a and b is a real number.
-- outputs: a is minimum if (a<B) else b.

5. If √2 = 1.414, and the square_root() function returns -1.414, does it violate the following specification?
-- square_root (x)
-- inputs: x is a real number , x ≥ 0
-- outputs: y is a real number such that y2=x

Yes it violates the specification.

PART - III

1. When do you say that a problem is algorithmic in nature?

We usually say that a problem is algorithmic in nature when its solution involves the construction of an algorithm. Some types of problems can be immediately recognized as algorithmic.

2. What is the format of the specification of an algorithm?

The algorithm S is specified as

1. algorithm_name (inputs)
2. -- inputs : P
3. -- outputs: Q

This specification means that if the algorithm starts with inputs satisfying P, then it will finish with the outputs satisfying Q.

3. What is abstraction?

Abstraction is the process of **hiding or ignoring** the details irrelevant to the task so as to model a problem only by its essential features.

4. How is state represented in algorithms?

State is a basic and important abstraction. Computational processes have state. A computational process starts with an initial state. As actions are performed, its state changes. It ends with a final state. State of a process is abstracted by a set of variables in the algorithm.

5. What is the form and meaning of assignment statement?

Variables are named boxes to store values. Assignment statement is used to store a value in a variable. It is written with the variable on the left side of the assignment operator and a value on the right side.

variable := value

Ex.

m := 2

6. What is the difference between assignment operator and equality operator?

Assignment Operator	**Equality Operator**
An assignment operator**(:=)**, first evaluate all the expressions on the right side using the current values of the variables, and then store them in the corresponding variables on the left side.	The equality operator **(==)** is used to compare two values or expressions. The result is true if the expressions are equal and false otherwise.
Ex.	**Ex.**
m, n := 2 , 5	(5==5) **True,** (3==2) **False**

PART - IV

1. Write the specification of an algorithm hypotenuse whose inputs are the lengths of the two shorter sides of a right angled triangle, and the output is the length of the third side.

(i) Let us name the algorithm hypotenuse.
(ii) It takes the number as the input. Let us name the input S1, S2 should not be negative.
(iii) It produces the Hypotenuse of S1, S2 as the output. Let us name the output l. Then S1, S2 should be the square of l.

Now the specification of the algorithm is
Hypotenuse (S1, S2)
- **inputs :** S1 and S2 are real numbers or integers.
- **outputs :** l is a real number such that l2 = S12 + S22

2. Suppose you want to solve the quadratic equation ax2 + bx + c = 0 by an algorithm.

quadratic_solve (a, b, C)
-- inputs : ?
-- outputs: ?

You intend to use the formula and you are prepared to handle only real number roots. Write a suitable specification.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Solution

quadratic_solve (a, b, C)
-- Inputs: a, b, c are real numbers, a ≠ 0
-- Outputs: x is a real number, the quadration equation ax2 + bx + c = 0 is satisfied by exactly two values fx, namely

$$X1 = \frac{-b+\sqrt{b^2-4ac}}{2a}$$

and

$$X2 = \frac{-b-\sqrt{b^2-4ac}}{2a}$$

3. Exchange the contents: Given two glasses marked A and B. Glass A is full of apple drink and glass B is full of grape drink. For exchanging the contents of glasses A and B, represent the state by suitable variables, and write the specification of the algorithm.

(i) Let us name the algorithm exchange.
(ii) It takes the number as the input. Let us name the input a, b. a,b should not be zero.
(iii) It produces the exchange of a,b by using third variable t as the output. Let us name the output. Then a, b, t should be exchange of the drinks.

Now the specification of the algorithm is Exchange (a, b)
-- inputs : a, b are integers, a ≠ 0, b ≠ 0
-- outputs : a, b are integers,

```
t : = a
a : = b
b := t
```

Composition and Decomposition | CHAPTER 7

PART - I

I Choose the Best Answer

1. Suppose u, v = 10 ,5 before the assignment. What are the values of u and v after the sequence of assignments?

```
1 u := v
2 v := u
```

A) u, v = 5 ,5 B) u, v = 5 ,10 C) u, v = 10 ,5 D) u, v = 10 ,10

2. Which of the following properties is true after the assignment (at line 3)?

```
1 -- i+j = 0
2 i, j := i+1, j-1
3 -- ?
```

A) i+j >0 B) i+j < 0 **C) i+j =0** D) i = j

3. If C1 is false and C2 is true, the compound statement

```
1 if C1
2 S1
3 else
4 if C2
5 S2
6 else
7 S3
```

executes

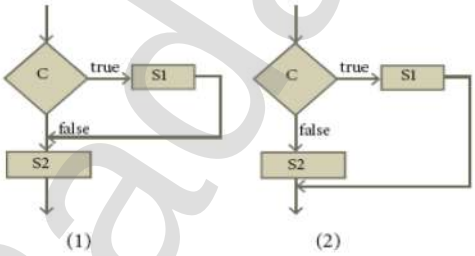
A) S1 **B) S2** C) S3 D) none

4. If C is false just before the loop, the control flows through

```
1 S1
2 while C
3 S2
4 S3
```

A) S1 ; S3 B) S1 ; S2 ; S3 C)S1 ; S2 ; S2 ; S3 D) S1 ; S2 ; S2 ; S2 ; S3

5. If C is true, S1 is executed in both the flowcharts, but S2 is executed in



A) (1) only B) (2) only C) both (1) and (2) D) neither (1) nor (2)

6. How many times the loop is iterated?

```
i := 0
while i ≠ 5
i := i + 1
```

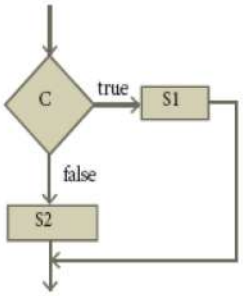
A) 4 **B) 5** C) 6 D) 0

PART - II

1. Distinguish between a condition and a statement.

Condition	Statement
Conditional statement is executed only if the condition is true. Otherwise, nothing is done.	A statement is a phrase that commands the computer to do an action. It is a simple statement, used to change the values of variables.

2. Draw a flowchart for conditional statement.



3. Both conditional statement and iterative statement have a condition and a statement. How do they differ?

- ***Conditional*** statement executes the true statement if the condition is true otherwise executing false statement.
- ***Iterative*** statement executes the statement repeatedly until the condition is false.

4. What is the difference between an algorithm and a program?

- An algorithm is a step by step procedure to solve any problem.
- A programming language is a notation for expressing algorithms so that a computer can execute the algorithm. An algorithm expressed in a programming language is called a program.

5. Why is function an abstraction?

- A function is an abstraction of a sub problem, and specified by its input property, and its input - output relation.
- To use a function in the main algorithm, the user needs to know only the specification of the function — the function name, the input property, and the input output relation.

6. How do we refine a statement?

In refinement, starting at a high level, each statement is repeatedly expanded into more detailed statements in the subsequent levels.

PART - III

1. For the given two flowcharts write the pseudo code.

2. If C is false in line 2, trace the control flow in this algorithm.

1 S1
2 -- C is false
3 if C
4 S2
5 else
6 S3
7 S4

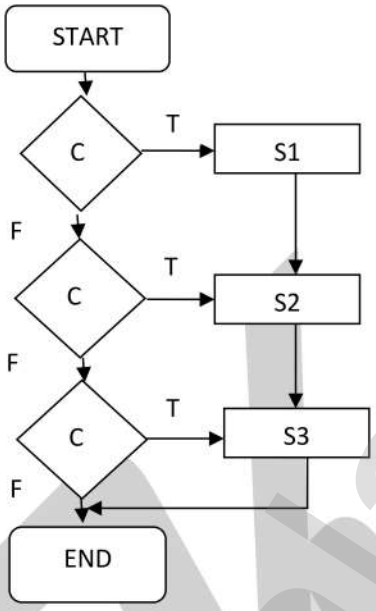
Answer

S1,S3,S4

3. What is case analysis?

- Case analysis statement generalizes it to multiple cases.
- Case analysis splits the problem into an exhaustive set of disjoint cases.

4. Draw a flowchart for -3case analysis using alternative statements.



5. Define a function to double a number in two different ways: (1) n+n, (2) 2xn

1)n + n

--Input: n is a real number or an integer, **n>0**

--Output: y is a real number or an integer such that **y = n + n**

2) 2 x n

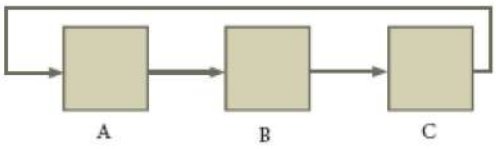
--Input: n is a real number or an integer, **n>0**

--Output: y is a real number or an integer such that **y = 2** x **n**

PART - IV

1. Exchange the contents: Given two glasses marked A and B. Glass A is full of apple drink and glass B is full of grape drink. Write the specification for exchanging the contents of glasses A and B, and write a sequence of assignments to satisfy the specification.

2. Circulate the contents: Write the specification and construct an algorithm to circulate the contents of the variables A, B and C as shown below: The arrows indicate that B gets the value of A, C gets the value of B and A gets the value of C.



3. Decanting problem. You are given three bottles of capacities 5 ,8, and 3 litres. The 8L bottle is filled with oil, while the other two are empty. Divide the oil in 8L bottle into two equal quantities. Represent the state of the process by appropriate variables. What are the initial and final states of the process? Model the decanting of oil from one bottle to another by assignment. Write a sequence of assignments to achieve the final state.

4. Trace the step-by-step execution of the algorithm for factorial (4).

factorial(n)
-- inputs : n is an integer , n ≥ 0
-- outputs : f = n!
f, i := 1 ,1
while i ≤ n
f, i := f × i, i+1

Iteration and recursion CHAPTER 8

PART - I

I Choose the Best Answer

1. A loop invariant need not be true
   A) at the start of the loop. B) at the start of each iteration
   C) at the end of each iteration **D) at the start of the algorithm**

2. We wish to cover a chessboard with dominoes, ☐☐ the number of black squares and the number of white squares covered by dominoes, respectively, placing a domino can be modeled by
   A) b := b + 2 B) w := w + 2 C) b, w := b+1, w+1 **D) b := w**

3. If m x a + n x b is an invariant for the assignment a, b : = a + 8, b + 7, the values of m and n are
   A) m = 8, n = 7 **B) m = 7, n = -8** C) m = 7, n = 8 D) m = 8, n = -7

4. Which of the following is not an invariant of the assignment?
   m, n := m+2, n+3
   A) m mod 2 B) n mod 3 C) 3 X m - 2 X n **D) 2 X m - 3 X n**

5. If Fibonacci number is defined recursively as

$$F(n)=\begin{cases}0 & n=0\\ 1 & n=1\\ F(n-1)+F(n-2) & \text{otherwise}\end{cases}$$

to evaluate F(4), how many times F() is applied?
   A) 3 B) 4 C) 8 D) 9

6. Using this recursive definition

$$a^n=\begin{cases}1 & \text{if } n=0\\ a \times a^{n-1} & \text{otherwise}\end{cases}$$

how many multiplications are needed to calculate a10?
   A) 11 B) 10 **C) 9** D) 8

PART - II

1. What is an invariant?

An expression involving variables, which remains unchanged by an assignment to one of these variables, is called an invariant of the assignment.

2. Define a loop invariant.

An invariant for the loop body is known as a loop invariant.

3. Does testing the loop condition affect the loop invariant? Why?

Yes it affects,

A loop invariant is true at
   a) at the start of the loop (just before the loop)
   b) at the start of each iteration (before loop body)
   c) at the end of each iteration (after loop body)
   d) at the end of the loop (just after the loop)

4. What is the relationship between loop invariant, loop condition and the input-output recursively?

The loop invariant is true before the loop body and after the loop body, each time.

The loop condition is decide number of iteration in the loop.

5. What is recursive problem solving?

Each solver should test the size of the input. If the size is small enough, the solver should output the solution to the problem directly. If the size is not small enough, the solver should reduce the size of the input and call a sub-solver to solve the problem with the reduced input.

6. Define factorial of a natural number recursively.

The **factorial** of a **number** is the product of all the integers from 1 to that **number**." ***For example***, the **factorial** of 4 (denoted as 4!) is 1*2*3*4*5= 120.

Factorial is not defined for negative numbers and the factorial of zero is one,0! =1.

PART - III

1. There are 7 tumblers on a table, all standing upside down. You are allowed to turn any 2 tumblers simultaneously in one move. Is it possible to reach a situation when all the tumblers are right side up? (Hint: The parity of the number of upside down tumblers is invariant.)

2. A knockout tournament is a series of games. Two players compete in each game; the loser is knocked out (i.e. does not play any more), the winner carries on. The winner of the tournament is the player that is left after all other players have been knocked out. Suppose there are 1234 players in a tournament. How many games are played before the tournament winner is decided?

3. King Vikramaditya has two magic swords. With one, he can cut off 19 heads of a dragon, but after that the dragon grows 13 heads. With the other sword, he can cut off 7 heads, but 22 new heads grow. If all heads are cut off, the dragon dies. If the dragon has originally 1000 heads, can it ever die? (Hint:The number of heads mod 3 is invariant.)

PART - IV

1. Assume an 8 × 8 chessboard with the usual coloring. "Recoloring" operation changes the color of all squares of a row or a column. You can recolor repeatedly. The goal is to attain just one black square. Show that you cannot achieve the goal. (Hint: If a row or column has b black squares, it changes by (|8 - b) - b|).

2. Power can also be defined recursively as

$$a^n = \begin{cases} 1 & \text{if } n = 0 \\ a \times a^{n-1} & \text{if } n \text{ is odd} \\ a^{n/2} \times a^{n/2} & \text{if } n \text{ is even} \end{cases}$$

Construct a recursive algorithm using this definition. How many multiplications are needed to calculate a10?

3. A single-square-covered board is a board of 2n x 2n squares in which one square is covered with a single square tile. Show that it is possible to cover the board with triominoes without overlap.

Introduction to C++ CHAPTER 9

PART –I

Choose the correct answer

1. Who developed C++?
   (a) Charles Babbage **(b) Bjarne Stroustrup** (c) Bill Gates (d) Sundar Pichai
2. What was the original name given to C++?
   (a) CPP (b) Advanced C **(c) C with Classes** (d) Class with C
3. Who coined C++?
   (a) Rick Mascitti (b) Rick Bjarne (c) Bill Gates (d) Dennis Ritchie
4. The smallest individual unit in a program is:
   (a) Program (b) Algorithm (c) Flowchart **(d) Tokens**
5. Which of the following operator is extraction operator of C++?
   (a) >> (b) << (c) <> (d) ^^
6. Which of the following statements is not true?
   (a) Keywords are the reserved words convey specific meaning to the C++ compiler.
   (b) Reserved words or keywords can be used as an identifier name.
   (c) An integer constant must have at least one digit without a decimal point.
   (d) Exponent form of real constants consists of two parts
7. Which of the following is a valid string literal?
   (a) 'A' (b) 'Welcome' (c) 1232 **(d) "1232"**
8. A program written in high level language is called as
   (a) Object code **(b) Source code** (c) Executable code (d) All the above
9. Assume a=5, b=6; what will be result of a&b?
   (a) 4 (b) 5 (c) 1 (d) 0
10. Which of the following is called as compile time operators?
    (a) **sizeof** (b) pointer (c) virtual (d) this

PART – II

Answer to the following questions (2 Marks)

1. What is meant by a token? Name the token available in C++.

The smallest individual unit in a program is known as a Token or a Lexical unit

- ✓ Keywords
- ✓ Identifiers
- ✓ Constants
- ✓ Operators
- ✓ Punctuators

2. What are keywords? Can keywords be used as identifiers?

- ➢ Keywords are the reserved words which convey specific meaning to the C++ compiler.
- ➢ Reserved words or keywords cannot be used as an identifier name.

3. The following constants are of which type?

A. 39 - **Decimal (Integer)**
B. 032 - **Octal (Integer)**
C. 0XCAFE - **Hexadecimal (Integer)**

D. 04.14 - **Real constant (Floating Point)**

4. Write the following real constants into the exponent form:

A. (i) 23.197 - **0.23197 X 102** **0.23197E02**

B. (ii) 7.214 - **0.7214 X 101** **0.7214E01**

C. (iii) 0.00005 - **0.5 X 10-4** **0.5E-04**

D. (iv) 0.319 - **0.0319 X 101** **0.0319E01**

5. Assume n=10; what will be result of n++ and --n;?

n++

n=n+1

n=11

--n

n=n-1

n=9

6. Match the following

NO.	A	B	ANSWER
1	Modulus	Tokens	4
2	Separators	Remainder of a division	1
3	Stream extraction	Punctuators	2
4	Lexical Units	get from	3

PART - III

Answer to the following questions (3 Marks)

1. Describe the differences between keywords and identifiers?

Keywords

Keywords are the reserved words which convey specific meaning to the C++ compiler.

Ex. This, case, int, long, etc..

Identifiers

Identifiers are the user-defined names given to different parts of the C++ program.

Ex. variables, functions, arrays, classes etc.,

2. Is C++ case sensitive? What is meant by the term "case sensitive"?

Yes, C++ is case sensitive as it treats upper and lower-case characters differently.

Ex.

A and a is different.

3. Differentiate "=" and "==".

Relational operator (==) are used to determine the relationship between its operands.

Ex.

== Equal to a == b

Assignment operator(=) copies the value at the right side of the operator to the left side variable. It is also a binary operator.

Ex.

A=10

4. What is the use of a header file?

The header file iostream should include in every C++ program to implement input / output functionalities. If you fail to include iostream in your program, an error message will occur on cin and cout; and we will not be able to get any input or send any output.

5. Why is main function special?

Every C++ program must have a main function. The main( ) function is the starting point where all C++ programs begin their execution. Therefore, the executable statements should be inside the main( ) function.

PART - IV

Answer to the following questions (5 Marks)

1. Write about Binary operators used in C++.

Binary Operators - Require two operands

C++ Operators are classified as

- Arithmetic Operators
- Relational Operators
- Logical Operators
- Bitwise Operators
- Assignment Operators

Arithmetic Operators

Arithmetic operators perform simple arithmetic operations like addition, subtraction, multiplication, division etc.,

Operator	Operation	Example
+	Addition	10 + 5 = 15
-	Subtraction	10 – 5 = 5
*	Multiplication	10 * 5 = 50
/	Division	10 / 5 = 2 (Quotient of the division)
%	Modulus (To find the reminder of a division)	10 % 3 = 1(Remainder of the division)

Relational Operators

Relational operators are used to determine the relationship between its operands. When the relational operators are applied on two operands, the result will be a Boolean value i.e 1 or 0 to represents True or False respectively.

Operator	Operation	Example
>	Greater than	a > b
<	Less than	a < b
>=	Greater than or equal to	a >= b
<=	Less than or equal to	a <= b
==	Equal to	a == b
!=	Not equal	a != b

Logical Operators

A logical operator is used to evaluate logical and relational expressions. The logical operators act upon the operands that are themselves called as logical expressions.

Operator	Operation	Description
&&	AND	It returns 1 (True), if both expression are true, otherwise it returns 0 (false).
||	OR	It returns 1 (True), if either one of the expression is true. It returns 0 (false), if both the expressions are false.
!	NOT	If an operand / expression is 1 (true) then this operator returns 0 (false) and vice versa

Bitwise Operators

Bitwise operators work on each bit of data and perform bit-by-bit operation. In C++, there are three kinds of bitwise operators, which are:

- Logical bitwise operators
- Bitwise shift operators
- One's compliment operators

Assignment Operator

Assignment operator is used to assign a value to a variable which is on the left hand side of an assignment statement. = (equal to) is commonly used as the assignment operator in all computer programming languages.

Ex.

A=10

2. What are the types of Errors?

Syntax Error

Syntax is a set of grammatical rules to construct a program. Every programming language has unique rules for constructing the source code.

Syntax errors occur when grammatical rules of C++ are violated.

Example: if you type as follows, C++ will throw an error.

int num

As per grammatical rules of C++, every executable statement should terminate with a semicolon. But, this statement does not end with a semicolon.

Semantic Error

A Program has not produced expected result even though the program is grammatically correct. It may be happened by wrong use of variable / operator / order of execution etc. This means, program is grammatically correct, but it contains some logical error. So, Semantic error is also called as "Logic Error".

Run-time error

A run time error occurs during the execution of a program. It is occurs because of some illegal operation that takes place.

Example, if a program tries to open a file which does not exist, it results in a run-time error

Data Types, Variables and Expressions

PART – I

Choose the correct answer.

1. How many categories of data types available in C++?
   (a) 5 (b) 4 **(c) 3** (d) 2
2. Which of the following data types is not a fundamental type?
   (a) signed (b) int (c) float (d) char
3. What will be the result of following statement?
   ```
   char ch= 'B';
   cout << (int) ch;
   ```
   (a) B (b) b (c) 65 **(d) 66**
4. Which of the character is used as suffix to indicate a floating point value?
   (a) F (b) C (c) L (d) D
5. How many bytes of memory allocates for the following variable declaration if you are using Dev C++? short int x;
   (a) 2 (b) 4 (c) 6 (d) 8
6. What is the output of the following snippet?
   ```
   char ch = 'A';
   ch = ch + 1;
   ```
   (a) B (b) A1 (c) F (d) 1A
7. Which of the following is not a data type modifier?
   (a) signed **(b) int** (c) long (d) short
8. Which of the following operator returns the size of the data type?
   (a) sizeof( ) (b) int ( ) (c) long ( ) (d) double ( )
9. Which operator to be used to access reference of a variable?
   (a) $ (b) # **(c) &** (d) !
10. This can be used as alternate to endl command:
    (a) \t (b) \b (c) \0 **(c) \n**

PART – II

Answers to all the questions (2 Marks)

1. Write a short note const keyword with an example.

Constants are data items whose values do not change during the execution of a program. const is the keyword used to declare a constant. const keyword modifies / restricts the accessibility of a variable.

For example,

```
const int num = 100;
```

2. What is the use of setw( ) format manipulator?

setw manipulator sets the **width of the field** assigned for the output. The field width determines the minimum number of characters to be written in output.

3. Why is char often treated as integer data type?

Character data type accepts and returns all valid ASCII characters. Character data type is often said to be an integer type, since all the characters are represented in memory by their associated **ASCII Codes.**

4. What is a reference variable? What is its use?

- A reference provides an alias for a previously defined variable. Declaration of a reference consists of base type and an **& (ampersand)** symbol.
- Reference variable name is assigned the value of a previously declared variable.

5. Consider the following C++ statement. Are they equivalent?

char ch = 67;
char ch = 'C';

Yes, they are equivalent because ASCII code of **'C'** is **67.**

6. What is the difference between 56L and 56?

- **56L** - 56 is declared as long data type. It stores 4 bytes.
- **56** - 56 is declared as int data type. It stores 2 bytes.

7. Determine which of the following are valid constant? And specify their type.

a. 0.5 - Valid Floating Constant
b. 'Name' - Invalid String Constant
c. '\t' - Valid Character constant
d. 27,822 - Invalid Decimal Constant

8. Suppose x and y are two double type variable that you want add as integer and assign to an integer variable. Construct a C++ statement for the doing so.

```
double x,y;
int z;
z=(int)x+(int)y;
```

9. What will be the result of following if num=6 initially.

(a) cout << num;
(b) cout << (num==5);

a. 6
b. 0

10. Which of the following two statements are valid? Why? Also write their result.

int a;
(i) a = 3,014; **Invalid**(Comma is not allowed in decimal constants)
(ii) a=(3,014); **Invalid**(Comma is not allowed in decimal constants)

PART – III

Answers to all the questions (3 Marks)

1. What are arithmetic operators in C++? Differentiate unary and binary arithmetic operators. Give example for each of them.

Arithmetic operators perform simple arithmetic operations like addition, subtraction, multiplication, division etc.,

Unary Operators - Require only one operand
Ex. ++ Increment, -- Decrement operator
a++, --b
Binary Operators - Require two operands
a+b

2. How relational operators and logical operators related to one another?

Relational operators

Relational operators are used to determine the relationship between its operands. When the relational operators are applied on two operands, the result will be a Boolean value i.e 1 or 0 to represents.

Logical operators

A logical operator is used to evaluate logical and relational expressions. The logical operators act upon the operands that are themselves called as logical expressions.

3. Evaluate the following C++ expressions where x, y, z are integers and m, n are floating point numbers. The value of x = 5, y = 4 and m=2.5;

(i) n = x + y / x;

n = 5 + 4 / 5
n = 5 + 0
n = 5

(ii) z = m * x + y;

z = 2.5 * 5 + 4
z =12.5 + 4
z = 16.5
z = 16

(iii) z = (x++) * m + x;

z = (5++) * 2.5 + 5
z = 5 * 2.5 + 5
z = 12.5 + 5
z = 17.5
z = 17

Evaluate Yourself (Page No. 119)

1. What is meant by literals? How many types of integer literals available in C++?

Literals are data items whose values do not change during the execution of a program.

Therefore Literals are called as Constants.

Types of integer literals:

i. Decimal
ii. Octal
iii. Hexadecimal

2. What kind of constants are following?

A. 26 - **Integer**
B. 015 - **Octal**
C. 0xF - **Hexadecimal**
D. 014.9 - **Floating**

3. What is character constant in C++?

A character constant is any valid single character enclosed within single quotes. A character constant in C++ must contain one character and must be enclosed within a single quote.

Example : 'A', '2', '$'

4. How are non graphic characters represented in C++?

Non-printable characters are also called as non-graphical characters. Non-printable characters are those characters that cannot be typed directly from a keyboard during the execution of a program in C++, **for example:** backspace, tabs etc.

5. Write the following real constants into exponent form:

A. 32.179 - 0.32179E-2
B. 8.124 - 0.8123E-1
C. 0.00007 - 0.7E4

6. Write the following real constants into fractional form:

A. 0.23E4 - 0.0023
B. 0.517E-3 - 517
C. 0.5E-5 - 50000

7. What is the significance of null (\0) character in a string?

By default, string literals are automatically added with a special character **'\0' (Null)** at the end. Therefore, the string "welcome" will actually be represented as "welcome\0" in memory

Evaluate Yourself (Page No. 123)

1. What is use of operators?

The symbols which are used to do some mathematical or logical operations are called as **"Operators".** The data items or values that the operators act upon are called as **"Operands".**

2. What are binary operators? Give examples arithmetic binary operators.

Binary Operators - Require two operands

Operator	Operation	Example
+	Addition	10 + 5 = 15
-	Subtraction	10 – 5 = 5
*	Multiplication	10 * 5 = 50
/	Division	10 / 5 = 2 (Quotient of the division)
%	Modulus (To find the reminder of a division)	10 % 3 = 1(Remainder of the division)

3. What does the modulus operator % do?

Modulus is to find the reminder of a division.

Ex.

10 % 3 = 1(Remainder of the division)

4. What will be the result of 8.5 % 2?

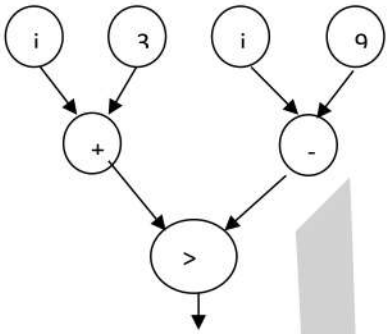
Throw an error on compilation as, modulus operator % operates on integer data type only.

5. Give that i = 8, j = 10, k = 8, what will be result of the following expressions?

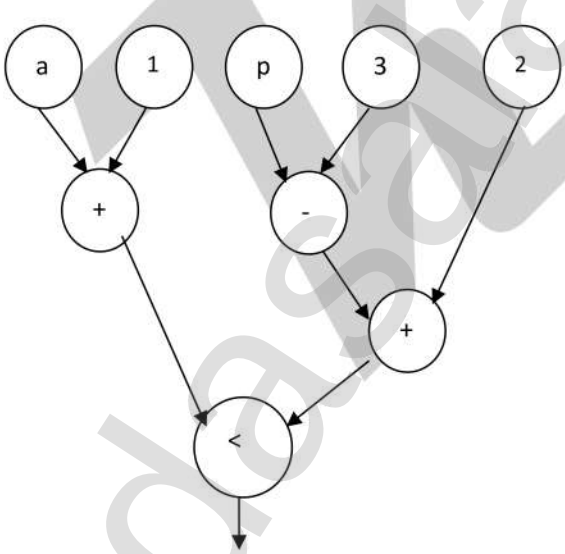
A	i < k	8<8	**0**
B	i < j	8<10	**1**
C	i > = k	8>=8	**1**
D	i = = j	8==10	**0**
E	j! = k	10!=8	**1**

6. What will be the order of evaluation for the following expressions?

(i) i + 3 >= j - 9



(ii) a +10 < p - 3 + 2 q



7. Write an expression involving a logical operator to test, if marks are 75 and grade is 'A'.

```
if (marks >=74 && marks <=100)
Grade = 'A';
```

Evaluate Yourself (Page No. 135)

1. What do you mean by fundamental data types?

Fundamental (atomic) data types are predefined data types available with C++. There are five fundamental data types in C++: **char, int, float, double** and **void**.

2. The data type char is used to represent characters. Then why is it often termed as an integer type?

Character data type accepts and returns all valid ASCII characters. Character data type is often said to be an integer type, since all the characters are represented in memory by their associated **ASCII Codes.**

3. What is the advantage of floating point numbers over integers?

- They can represent values between the integers.
- They can represent a much greater range of values.

4. The data type double is another floating point type. Then why is it treated as a distinct data type?

The double is also used for handling floating point numbers. But, this type occupies double the space than float type. This means, more fractions can be accommodated in double than in float type. The double is larger and slower than type float.

5. What is the use of void data type?

The literal meaning for void is 'empty space'. Here, in C++, the void data type specifies an empty set of values. It is used as a return type for functions that do not return any value.

Evaluate Yourself (Page No. 143)

1. What is modifiers? What is the use of modifiers?

Modifiers are used to modify the storing capacity of a fundamental data type except void type. Usually, every fundamental data type has a fixed range of values to store data items in memory.

2. What is wrong with the following C++ statement:

long float x;

Float data type is not allowed long modifier.

3. What is variable? Why a variable called symbolic variable?

- Variables are user-defined names assigned to specific memory locations in which the values are stored.
- Variables are also identifiers; and hence, the rules for naming the identifiers should be followed while naming a variable. These are called as symbolic variables because these are named locations.

4. What do you mean by dynamic initialization of a variable? Give an example.

A variable can be initialized during the execution of a program. It is known as "Dynamic initialization".

For example,

```
int sum = num1+num2;
```

5. What is wrong with the following statement?

const int x;

Constant variable must have at least one digit and must not contain any fractional part.

Evaluate Yourself (Page No. 149)

1. What is meant by type conversion?

The process of converting one fundamental type into another is called as "Type Conversion". C++ provides two types of conversions.

1. Implicit type conversion
2. Explicit type conversion.

2. How implicit conversion different from explicit conversion?

Implicit Conversion	Explicit Conversion
An Implicit type conversion is a conversion performed by the compiler automatically. So, implicit conversion is also called as **"Automatic conversion".**	C++ allows explicit conversion of variables or expressions from one data type to another specific data type by the programmer. It is called as **"type casting".**

3. What is difference between endl and \n?

- **endl** – Inserts a new line and flushes the buffer (Flush means – clean)
- **'\n'** - Inserts only a new line.

4. What is the use of references?

Declaration of a reference consists of base type and an & (ampersand) symbol; reference variable name is assigned the value of a previously declared variable.

5. What is the use of setprecision ( )?

This is used to display numbers with fractions in specific number of digits.

Syntax:

setprecision (number of digits);

Flow of Control | CHAPTER 10

PART - I

Choose the Correct Answer

1. What is the alternate name of null statement?
   A) No statement **B) Empty statement**
   C) Void statement D) Zero statement
2. In C++, the group of statements should enclosed within:
   A) { } B) [ ] C) ( ) D) < >
3. The set of statements that are executed again and again in iteration is called as:
   A) condition B) loop C) statement **D) body of loop**
4. The multi way branching statement:
   A) if B) if … else **C) switch** D) for
5. How many types of iteration statements?
   A) 2 **B) 3** C) 4 D) 5
6. How many times the following loop will execute? for(int i=0; i<10; i++)
   A) 0 **B) 10** C) 9 D) 11
7. Which of the following is the exit control loop?
   A) for B) while **C) do...while** D) if...else
8. Identify the odd one from the keywords of jump statements:
   A) break **B) switch** C) goto D) continue
9. Which of the following is the entry control loop?
   A) do-while **B) for** **C) while** D) if-else
10. A loop that contains another loop inside its body:
    A) Nested loop B) Inner loop
    C) Inline loop D) Nesting of loop

PART – II

Answers to all the questions (2 Marks)

1. What is a null statement and compound statement?

- Empty loop means a loop has no statement in its body is called an empty loop.
- ***Null statement*** is semicolon is ended after the for loop.
- C++ allows a group of statements enclosed by pair of braces {}. This group of statements is called as a compound statement or a block.

2. What is selection statement? Write its types?

In a program a decision causes a one-time jump to a different part of a program.

- ✓ if statement
- ✓ if-else statement
- ✓ Nested if
- ✓ if -else-if ladder
- ✓ The ?: Alternative to if- else
- ✓ Switch statement

3. Correct the following code segment:

Wrong Code	Correct Code

if (x=1)
p= 100;
else
p = 10;
	if (x==1)
	p= 100;
	else
	p = 10;

4. What will be the output of the following code:

```
int year;
cin >> year;
if (year % 100 == 0)
if ( year % 400 == 0)
cout << "Leap";
else
cout << "Not Leap year";
```

If the input given is

I. 2000 - **Leap**
II. 2003 - **Not Leap year**
III. 2010? - **Not Leap year**

5. What is the output of the following code?

```
for (int i=2; i<=10 ; i+=2)
cout << i;
```

2 4 6 8 10

6. Write a for loop that displays the number from 21 to 30.

```
for (int i=21; i<=30 ; i++)
cout << " "<<i;
```

7. Write a while loop that displays numbers 2, 4, 6, 8.....20.

```
int i=2;
while(i<=20)
{
cout<<" "<<i;
i++;
}
```

8. Compare an if and a ? : operator.

if	**? : operator**
The if statement evaluates a condition, if the condition is true then a true-block is executed, otherwise the true-block is skipped.	The conditional operator (or Ternary operator) is an alternative for 'if else statement'. The conditional operator that consists of two symbols (?:). It takes three arguments.

PART – III

Answers to all the questions (3 Marks):

1. Convert the following if-else to a single conditional statement:

```
if (x >= 10)
a = m + 5;
else
a = m;
```

a=(x>=10)?m+5:m

2. Rewrite the following code so that it is functional:

Error Program

```
v = 5;
do;
{
total += v;
cout << total;
while v <= 10
```

Correct Program

```
int total=0,v = 5;
do
{
        total += v;
        cout << total;
        v++;
}while(v<=10);
```

3. Write a C++ program to print multiplication table of a given number.

```
#include<iostream>
using namespace std;
int main()
{
        int n;
        cout<<"Enter a number to calculate Multiplication table ";
        cin>>n;
        for(int i=1;i<=10;i++)
        {
                cout<<n<<" X "<<i<<" = "<<n*i<<endl;
        }
        return 0;
}
```

4. Write the syntax and purpose of switch statement.

The switch statement is a multi-way branch statement. It provides an easy way to dispatch execution to different parts of code based on the value of the expression.

Syntax

```
switch(expression)
{
case constant 1:
        statement(s);
        break;
case constant 2:
        statement(s);
        break;
.
.
.
.
default:
        statement(s);
}
```

5. Write a short program to print following series:

(a) 1 4 7 10…… 40

```
#include<iostream>
using namespace std;
int main()
```

```
{
        for (int i=1; i<=40 ; i+=3)
        cout << " "<<i;
        return 0;

}
```

PART – IV

Answers to all the questions (5 Marks)

1. Explain control statement with suitable example.

Control statements are statements that alter the sequence of flow of instructions. Control statements may be executed sequentially, selectively or iteratively. Every programming language provides statements to support sequence, selection (branching) and iteration.

Selection statement

The selection statement means the statement (s) are executed depends upon a condition. If a condition is true, a true block (a set of statements) is executed otherwise a false block is executed.

- ✓ if statement
- ✓ if-else statement
- ✓ Nested if
- ✓ if -else-if ladder
- ✓ The ?: Alternative to if- else
- ✓ Switch statement

Sequence statement

The **sequential statement** are the statements, that are executed one after another only once from top to bottom. These statements do not alter the flow of execution.

Iteration statement

The **iteration statement** is a set of statement are repetitively executed depends upon a conditions. If a condition evaluates to true, the set of statements (true block) is executed again and again. As soon as the condition becomes false, the repetition stops.

- ✓ For
- ✓ While
- ✓ Do while

2. What entry control loop? Explain any one of the entry control loop with suitable example.

An entry-control loop evaluated test-expression before the entering into a loop. Iteration (or looping) is a sequence of one or more statements that are repeatedly executed until a condition is satisfied.

C++ supports ***three types*** of iteration statements;

- ➢ for statement
- ➢ while statement
- ➢ do-while statement

While loop

A while loop is a control flow statement that allows the loop statements to be executed as long as the condition is true. The while loop is an entry-controlled loop because the test-expression is evaluated before the entering into a loop.

Syntax

```
while ( Test expression )
{
Body of the loop;
}
Statement-x;
```

Program

```
#include <iostream>
using namespace std;
int main ()
{
    int i=1,sum=0;
    while(i<=10)
    {
        sum=sum+i;
        i++;
    }
    cout<<"The sum of 1 to 10 is "<<sum;
    return 0;
}
```

Output

The sum of 1 to 10 is 55

3. Write a program to find the LCM and GCD of two numbers.

LCM

```
#include <iostream>
using namespace std;
int main()
{
int a,b,lcm;
cout << "Enter two numbers: ";
cin >>a>>b;
lcm = (a>b) ? a : b;
while (1)
{
if(lcm % a==0 && lcm % b==0)
{
cout << "The LCM of "<<a<<"
and"<<b<<" is " << lcm;
break;
}
lcm++;
}
return 0;
}
```

Output

```
Enter two numbers: 7 5
The LCM of 7 and 5 is 35
```

GCD

```
#include <iostream>
using namespace std;
int gcd(int a1, int b1)
{
if(b==0)
    return a1;
return gcd(b1,a1%b1);
}
int main()
{
int a,b;
cout << "Enter two numbers: ";
cin >>a>>b;
cout << "The LCM of "<<a<<"
and"<<b<<" is " << gcd(a,b);
return 0;
}
```

Output

```
Enter two numbers: 45 27
The GCD of 45 and 27 is 9
```

4. Write programs to find the sum of the following series:

(a) $x-\frac{x^2}{2!}+\frac{x^3}{3!}-\frac{x^4}{4!}+\frac{x^5}{5!}-\frac{x^6}{6!}$

(b) $x+\frac{x^2}{2}+\frac{x^3}{3}+....+\frac{x^n}{n}$

a)

```
#include <iostream>
using namespace std;
int main()
{
int x,p,i,j;
double fact=1.0,ans=0;
cout<<"Enter the value of x:";
cin>>x;
cout<<"\n Enter the power:";
cin>>p;
ans=x;
for(i=2,j=1;i<=p;i++,j++)
{
fact=fact*i;
if(i%2==0)
ans+=(pow(-1,j))*((pow(x,i))/(fact));
}
cout<<"\n The sum of the series is:"<<ans;
return 0;
}
```

b)

```
#include <iostream>
using namespace std;
int main()
{
clrscr();
int i,n;
float x,sum=0;
cout<<"\n Enter value of x and n:";
cin>>x>>n;
for(i=1;i<=n;++i)
sum+=pow(x,i)/i;
cout<<"\n sum="<<sum;
getch();
}
```

5. Write a program to find sum of the series

$S = 1 + x + x^2 + ... + x^n$

```
#include <iostream>
using namespace std;
int main()
```

```
{
clrscr();
long i,n,x,sum=0;
cout<<"\n Enter the value of x and  n:";
cin>>x>>n;
for(i=0;i<=n;++i)
sum+=pow(x,i);
cout<<"\n Sum="<<sum;
getch();
}
```

Functions CHAPTER 11

PART - I

Choose the correct answer

1. Which of the following header file defines the standard I/O predefined functions?
   A) stdio.h B) math.h C) string.h D) ctype.h
2. Which function is used to check whether a character is alphanumeric or not.
   A) isalpha() B) isdigit() **C) isalnum()** D) islower()
3. Which function begins the program execution?
   A) isalpha() B) isdigit() **C) main()** D) islower()
4. Which of the following function is with a return value and without any argument?
   A) x=display(int, int) **B) x=display()** C) y=display(float) D) display(int)
5. Which is return data type of the function prototype of add(int, int); ?
   A) int B) float C) char D) double
6. Which of the following is the scope operator?
   A) > B) & C) % **D) ::**

PART – II

Answer to all the questions (2 Marks):

1. Define Functions.

A large program can typically be split into smaller sized blocks called as functions where each sub-program can perform some specific functionality.

2. Write about strlen() function.

The **strlen()** takes a null terminated byte string source as its argument and returns its length. The length does not include the null(\0) character.

3. What are importance of void data type.

- To indicate the function does not return a value
- To declare a generic pointer.

4. What is Parameter and list its types?

Arguments or parameters are the means to pass values from the calling function to the called function. There are two types of parameter.

- **Formal parameters**.
- **Actual parameters.**

5. Write a note on Local Scope.

- A local variable is defined within a block.A block of code begins and ends with curly braces { }.
- The scope of a local variable is the block in which it is defined.
- A local variable cannot be accessed from outside the block of its declaration.

PART – III

Answer to the following questions (3 Marks)

1. What is Built-in functions?

C++ provides a rich collection of functions ready to be used for various tasks. The tasks to be performed by each of these are already written, debugged and compiled, their definitions alone are grouped and stored in files called **header files**. Such ready-to-use sub programs are called pre-defined functions or built-in functions.

2. What is the difference between isuppr() and toupper() functions ?

isuppr()

This function is used to check the given character is uppercase. This function will return 1 if true otherwise 0.

Ex.

int n=isupper('A');

Result= assign **1** to the variable n.

toupper()

This function is used to convert the given character into its uppercase. This function will return the upper case equivalent of the given character.

Ex.

char c = toupper('k');

Result= assign **K** to the variable c.

3. Write about strcmp() function.

The **strcmp()** function takes two arguments: string1 and string2. It compares the contents of string1 and string2 lexicographically.

The strcmp() function returns a:

- Positive value if the first differing character in string1 is greater than the corresponding character in string2. (ASCII values are compared)
- Negative value if the first differing character in string1 is less than the corresponding character in string2.
- 0 if string1 and string2 are equal.

4. Write short note on pow() function in C++.

The **pow()** function returns base raised to the power of exponent. If any argument passed to **pow()** is long double, the return type is promoted to long double. If not, the return type is double. The **pow()** function takes two arguments:

- **base** - the base value
- **exponent** - exponent of the base

5. What are the information the prototype provides to the compiler?

```
long fact (int, double)
```

- The return value of the function is of type long.
- **fact** is the name of the function.
- the function is called with two arguments:
  - The first argument is of int **data** type.
  - The second argument is of **double** data type.

6. What is default arguments? Give example.

The Default arguments allows to omit some arguments when calling the function.

When calling a function,

- For any missing arguments, complier uses the values in default arguments for the called function.
- The default value is given in the form of variable initialization.
  Example : **void defaultvalue(int n1=10, n2=100);**
- The default arguments facilitate the function call statement with partial or no arguments.
  Example : **defaultvalue(x,y);**
  defaultvalue(200,150);
  defaultvalue(150);
  defaultvalue(x,150);
- The default values can be included in the function prototype from right to left, i.e., we cannot have a default value for an argument in between the argument list.

Example : **void defaultvalue(int n1=10, n2);//**invalid prototype
void defaultvalue(int n1, n2 = 10);//valid prototype

PART – IV

Answer to the following questions (5 Marks)

1. Explain Call by value method with suitable example.

This method copies the value of an actual parameter into the formal parameter of the function. In this case, changes made to formal parameter within the function will have no effect on the actual parameter.

Program

```
#include<iostream>
using namespace std;
void display(int x)
{
int a=x*x;
cout<<"\n\nThe Value inside display function:"<<a;
}
int main()
{
int a;
cout<<"\Function call by value:";
cout<<"\n\nEnter the Value for A :";
cin>>a;
display(a);
cout<<"\n\nThe Value inside main function "<<a;
return(0);
}
```

Output :

```
Function call by value:
Enter the Value for A : 5
The Value inside display function : 25
The Value inside main function 5
```

2. What is Recursion? Write a program to find GCD using recursion.

A function that calls itself is known as recursive function. And, this technique is known as recursion.

Program

```
#include <iostream>
using namespace std;
int gcd(int a1, int b1)
{
if(b1==0)
        return a1;
return gcd(b1,a1%b1);
}
int main()
{
int a,b;
cout << "Enter two numbers: ";
cin >>a>>b;
cout << "The LCM of "<<a<<" and"<<b<<" is " << gcd(a,b);
return 0;
}
```

Output

```
Enter two numbers: 45 27
The GCD of 45 and 27 is 9
```

3. What are the different forms of function return? Explain with example.

A Function without return value and without parameter

The name of the function is **display()**, its return data type is void and it does not have any argument.

Program

```
#include<iostream>
using namespace std;
void display()
{
cout<<"First C++ Program with
Function";
}
int main()
{
display(); // Function calling statement
return(0);
}
```

Output :

```
First C++ Program with Function
```

A Function with return value and without parameter

The name of the function is **display()**, its return type is int and it does not have any argument. The **return** statement returns a value to the calling function and transfers the program control back to the calling statement.

Program

```
#include<iostream>
using namespace std;
int display()
{
int a, b, s;
cout<<"Enter 2 numbers: ";
cin>>a>>b;
s=a+b;
return s;
}
int main()
{
int m=display();
cout<<"\nThe Sum="<<m;
return(0);
}
```

Output :

```
Enter 2 numbers: 10 30
The Sum=40
```

A Function without return value and with parameter

The name of the function is display(), its return type is void and it has two parameters or arguments x and y to receive two values. The return statement returns the control back to the calling statement.

Program

```
#include<iostream>
using namespace std;
void display(int x, int y)
{
int s=x+y;
cout<<"The Sum of Passed Values:
"<<s;
}

int main()
{
int a,b;
cout<<"\nEnter the First Number :";
cin>>a;
cout<<"\nEnter the Second Number :";
cin>>b;
display(a,b);
return(0);
}
```

Output :

```
Enter the First Number :50
Enter the Second Number :45
The Sum of Passed Values: 95
```

A Function with return value and with parameter

The name of the function is display(), its return type is int and it has two parameters or arguments x and y to receive two values. The return statement returns the control back to the calling statement.

Program

```
#include<iostream>
using namespace std;
int display(int x, int y)
{
        int s=x+y;
        return s;
}
int main()
{
int a,b;
cout<<"\nEnter the First Number :";
cin>>a;
cout<<"\nEnter the Second Number :";
cin>>b;
int s=display(a,b);
cout<<"\nFunction with Return Value and with Arguments";
cout<<"\nThe Sum of Passed Values: "<<s;
return(0);
}
```

Output :

```
Enter the First Number :45
Enter the Second Number :67
Function with Return Value and with Arguments
The Sum of Passed Values: 112
```

4. Explain scope of variable with example.

Scope refers to the accessibility of a variable. There are four types of scopes in C++. They are: **Local scope, Function scope, File scope** and **Class scope**.

Local Scope:

- A local variable is defined within a block. A block of code begins and ends with curly braces { }.
- The scope of a local variable is the block in which it is defined.
- A local variable cannot be accessed from outside the block of its declaration.
- A local variable is created upon entry into its block and destroyed upon exit.

Function Scope:

- The scope of variables declared within a function is extended to the function block, and all sub-blocks therein.
- The life time of a function scope variable, is the life time of the function block. The scope of formal parameters is function scope.

File Scope

- A variable declared above all blocks and functions (including main ( )) has the scope of a file. The life time of a file scope variable is the life time of a program.
- The file scope variable is also called as global variable.

Class Scope

- A class is a new way of creating and implementing a user defined data type. Classes provide a method for packing together data of different types.
- Data members are the data variables that represent the features or properties of a class.

Program

```
#include<iostream>
using namespace std;
int va=20;
void add(int x, int y)
{
        int m=x+y+va;
        cout<<"\n The Sum = "<<m;
}
int main ( )
```

```
{
        int a, b ;
        a = 10;
        b = 20;
        add(a,b);
        cout<<"\nThe File Variable = "<<file_var;
        return(0);
}
```

Output:

The Sum = 50
The File Variable =20

5. Write a program to accept any integer number and reverse it.

```
#include <iostream>
using namespace std;
int main()
{
        int n, rev=0, rem;
        cout << "Enter an Integer Number: ";
        cin >> n;
        while(n!= 0)
        {
                rem=n%10;
                rev = rev*10 + remainder;
                n=n/10;
        }
        cout << "Reversed Number : " << rev;
        return 0;
}
```

Output:

Enter an Integer Number: 12345
Reversed number: 54321

Arrays and Structures CHAPTER 12

PART - I

1. Which of the following is the collection of variables of the same type that an referenced by a common name?
   a) int b) float **c) Array** d) class
2. int age[]={6,90,20,18,2}; How many elements are there in this array?
   a) 2 **b) 5** c) 6 d) 4
3. cin>>n[3]; To which element does this statement accepts the value?
   a) 2 b) 3 **c) 4** d) 5
4. By default, the string and with which character?
   a)\o b) \t c) \n d) \b
5. Structure definition is terminated by
   (a) : (b) } **(c) ;** (d) ::
6. What will happen when the structure is declared?
   (a) it will not allocate any memory **(b) it will allocate the memory**
   (c) it will be declared and initialized (d) it will be only declared
7. A structure declaration is given below.

```
struct Time
{
int hours;
int minutes;
int seconds;
}t;
```

Using above declaration which of the following refers to seconds.
   (a) Time.seconds (b) Time::seconds (c)seconds **(d) t. seconds**
8. Which of the following is a properly defined structure?
   (a) struct {int num;} (b) struct sum {int num;}
   (c) struct sum int sum; **(d) struct sum {int num;};**
9. A structure declaration is given below.

```
struct employee
{
int empno;
char ename[10];
}e[5];
```

Using above declaration which of the following statement is correct.
   (a) cout<<e[0].empno<<e[0].ename; (b) cout<<e[0].empno<<ename;
   (c)cout<<e[0]->empno<<e[0]->ename; (d) cout<<e.empno<<e.ename;
10. When accessing a structure member, the identifier to the left of the dot operator is the name of
   (a) structure variable (b) structure tag
   (c) structure member (d) structure function

PART – II

Answer to all the questions (2 Marks):

1. What is Traversal in an Array?

Accessing each element of an array at least once to perform any operation is known as "Traversal". Displaying all the elements in an array is an example of "traversal".

2. What is Strings?

A string is defined as a sequence of characters where each character may be a letter, number or a symbol. Each element occupies one byte of memory. Every string is terminated by a null ('\0', ASCII code 0) character.

3. What is the syntax to declare two – dimensional array.

Syntax

data-type array_name[row-size][col-size];

Ex.

int a[2][2];

4. Define structure .What is its use?

Structure is a user-defined which has the combination of data items with different datatypes. This allows to group variables of mixed data types together into a single unit.

5. What is the error in the following structure definition?

Error program	**Correct Program**
struct employee	struct employee
{	{
inteno;	int eno;
charename[20];	char ename[20];
char dept;	char dept;
}Employee e1,e2;	}e1,e2;

PART – III

Answer to all the questions (3 Marks):

1. Define an Array? What are the types?

An array is a collection of variables of the same type that are referenced by a common name.

There are different types of arrays used in C++. They are:

- ✓ One-dimensional arrays
- ✓ Two-dimensional arrays
- ✓ Multi-dimensional arrays

2. Write note an Array of strings.

An array of strings is a two-dimensional character array. The size of the first index (rows) denotes the number of strings and the size of the second index (columns) denotes the maximum length of each string.

Declaration

char Name[6][10];

Initialization

char Name[6][10] = {"Bean", "Bush", "Nicole", "Kidman", "Arnold", "Jodie"};

3. The following code sums up the total of all students name starting with 'S' and display it.

Fill in the blanks with required statements.

struct student {int examno,lang,eng,phy,che,mat,csc,total;char name[15];};

int main()

```
{
student s[20];
for(int i=0;i<20;i++)
{
cout<<" Enter the students exam number:";
cin>>s[i].examno;
cout<<" Enter the students Name:";
cin>> s[i].name;
cout<<" Enter the students lang,eng,phy,che,mat and csc marks:";
cin>> s[i].lang>> s[i].eng>> s[i].phy>> s[i].che>> s[i].mat>> s[i].csc;
s[i].total= s[i].lang+ s[i].eng+ s[i].phy+ s[i].che+ s[i].mat+ s[i].csc;
}
for(int i=0;i<20;i++)
{
if(s[i].name[0]=='S')
{
Cout<<"\n Name : "<<s[i].name;
cout<<"\nTotal Mark :"<< s[i].total;
}
}
return 0;
}
```

4. How to access members of a structure? Give example.

- Structure data members are accessed by using **dot(.) operator** between the object name and the member name.

  Ex.

  balu.rollno

- If the members are a pointer types then '→' is used to access the members.

  Ex.

  Student→name

5. What is called anonymous structure .Give an example.

A structure without a name/tag is called anonymous structure.

Example

```
struct
{
long rollno;
int age;
float weight;
}student;
```

The student can be referred as reference name to the above structure and the elements can be accessed like student.rollno, student.age and student.weight.

PART – IV

Answer to all the questions (5 Marks):

1. Write a C++ program to find the difference between two matrix.

```
#include<iostream>
using namespace std;
int main()
{
clrscr();
int a[3][3], b[3][3], sub[3][3], i, j;
cout<<"\nEnter Matrix A: ";
for(i=0; i<3; i++)
{
      for(j=0; j<3; j++)
      {
            cin>>a[i][j];
      }
}
cout<<"\nEnter matrix B: ";
for(i=0; i<3; i++)
{
      for(j=0; j<3; j++)
      {
            cin>>b[i][j];
      }
}
cout<<" \n Difference of two matrix is:";
for(i=0; i<3; i++)
{
      for(j=0; j<3; j++)
      {
            sub[i][j]=a[i][j]-b[i][j];
            cout<<sub[i][j]<<"   ";
      }
cout<<"\n";
}
return 0;
}
```

Output

```
Enter Matrix A:
5 5 5
5 5 5
5 5 5
Enter Matrix B:
3 3 3
3 3 3
3 3 3
Difference of two matrix is:
2 2 2
2 2 2
2 2 2
```

2. Write a C++ program to add two distances using the following structure definition

```
#include <iostream>
using namespace std;
struct Distance
{
int feet;
float inch;
}d1,d2,sum;
int main()
{
cout<<"Enter First distance"<< endl;
cout<<"Enter feet & Inch: ";
cin>> d1.feet>>d1.inch;
cout << "\nEnter information for Second distance" << endl;
cout << "Enter feet & Inch: ";
cin >> d2.feet>> d2.inch;
sum.feet = d1.feet+d2.feet;
sum.inch = d1.inch+d2.inch;
cout<< "Sum of distances = " << sum.feet <<"feet & " << sum.inch << " inches";
return 0;
}
```

3. Write the output of the following c++ program

Output

```
Details of Book No 1
-----------------------
Book Name :Programming
Book Author :Dromy

Details of Book No 2
-----------------------
Book Name :C++programming
Book Author :BjarneStroustrup

================================================
 S.No   | Book Name     |author
================================================
 1      |Programming    | Dromy
 2      |C++programming | BjarneStroustrup
================================================
```

4. Write the output of the following c++ program

Output

```
First Student
roll no : 1
name : Brown
phone no : 123443
Second Student
roll no : 2
name : Sam
phone no : 1234567822
Third Student
roll no : 3
name : Addy
phone no : 1234567844
```

5. Debug the error in the following program

Error Program

```
#include <istream.h>
structPersonRec
{
charlastName[10];
chaefirstName[10];
int age;
}
PersonRecPeopleArrayType[10];
voidLoadArray(PeopleRecpeop);
void main()
{
PersonRecord people;
for (i = 0; i < 10; i++)
{
cout<<people.firstName<<`
`<<people.lastName
<<setw(10) <<people.age;
}
}
LoadArray(PersonRecpeop)
{
for (int i = 0; i < 10; i++)
{
cout<< "Enter first name: ";
cin<<peop[i].firstName;
cout<< "Enter last name: ";
cin>>peop[i].lastName;
cout<< "Enter age: ";
cin>> people[i].age;
}
```

Correct Program

```
#include <iostream>
#include <iomanip>
using namespace std;
struct PersonRec
{
char lastName[10];
char firstName[10];
int age;
}peop[10];
void LoadArray(PersonRec peop[10]);
int main()
{
LoadArray(peop);
for (int i=0;i<10;i++)
{
cout<<peop[i].firstName<<''<<peop[i].la
stName<<setw(10)<<peop[i].age<<endl
;
}
return 0;
}
void LoadArray(PersonRec peop[10])
{
for (int i=0; i<10;i++)
{
cout<< "Enter first name: ";
cin>>peop[i].firstName;
cout<< "Enter last name: ";
cin>>peop[i].lastName;
cout<< "Enter age: ";
cin>>peop[i].age;
}
}
```

Introduction to Object Oriented Programming Techniques

CHAPTER 13

PART - I

Choose the correct answer

1. The term is used to describe a programming approach based on classes and objects is
   (A) OOP (B) POP (C) ADT (D) SOP
2. The paradigm which aims more at procedures.
   (A) Object Oriented Programming **(B)Procedural programming**
   (C) Modular programming (D)Structural programming
3. Which of the following is a user defined data type?
   (A) class (B) float (C) int (D) object
4. The identifiable entity with some characteristics and behaviour is.
   (A) class **(B) object** (C) structure (D) member
5. The mechanism by which the data and functions are bound together into a single unit is known as
   (A) Inheritance **(B) Encapsulation** (C) Polymorphism (D) Abstraction
6. Encapsulation of the data from direct access by the program is called as
   (A) Data hiding (B) Encapsulation (C) Polymorphism (D) Abstraction
7. Which of the following concept encapsulate all the essential properties of the object that are to be created?
   (A) class (B) Encapsulation (C) Polymorphism **(D) Abstraction**
8. Which of the following is the most important advantage of inheritance?
   (A) data hiding **(B) code reusability** (C) code modification (D) accessibility
9. "Write once and use it multiple time" can be achieved by
   (A) redundancy **(B) reusability** (C) modification (D) composition
10. Which of the following supports the transitive nature of data?
    (A) Inheritance (B) Encapsulation (C) Polymorphism (D) Abstraction 199

PART II

Answer to all the questions (2 Marks)

1. How is modular programming different from procedural programming paradigm?

Modular Programming	Procedural Programming
Modular Paradigm consists of multiple modules, each module has a set of functions of related types. Data is hidden under the modules.	Procedural means a list of instructions were given to the computer to do something. Procedural programming aims more at procedures.

2. Differentiate classes and objects.

Class is a user defined data type. Class represents a group of similar objects.

Objects are the basic unit of OOP. It represents data and associated function together in to a single unit.

3. What is polymorphism?

Polymorphism is the ability of a message or function to be displayed in more than one form.

4. How is encapsulation and abstraction are interrelated?

- Encapsulation is about binding the data variables and functions together in class.
- Abstraction refers to showing only the essential features without revealing background details.

5. Write the disadvantages of OOP.

- **Size -** Object Oriented Programs are much larger than other programs.
- **Effort -** Object Oriented Programs require a lot of work to create.
- **Speed -** Object Oriented Programs are slower than other programs, because of their size.

PART III

Answer to all the questions (3 Marks)

1. What is paradigm? Mention the different types of paradigm.

Paradigm means organizing principle of a program. It is an approach to programming. They are Procedural programming, Modular Programming and Object Oriented Programming

2. Write a note on the features of procedural programming.

- ✓ Programs are organized in the form of subroutines or sub programs
- ✓ All data items are global
- ✓ Suitable for small sized software application
- ✓ Difficult to maintain and enhance the program code as any change in data type needs to be propagated to all subroutines that use the same data type. This is time consuming.
- ✓ Example: **FORTRAN** and **COBOL**.

3. List some of the features of modular programming.

- ✓ Emphasis on algorithm rather than data
- ✓ Programs are divided into individual modules
- ✓ Each modules are independent of each other and have their own local data
- ✓ Modules can work with its own data as well as with the data passed to it.
- ✓ Example: Pascal and C

4. What do you mean by modularization and software reuse?

- **Modularisation:** where the program can be decomposed into **modules**.
- **Software re-use:** where a program can be composed from existing and new modules.

5. Define information hiding.

The data is not accessible to the outside world, and only those functions which are wrapped in the class can access it. These functions provide the interface between the object's data and the program. This encapsulation of data from direct access by the program is called data hiding or **information hiding.**

PART IV

Answer to all the questions (5 Marks)

1. Write the differences between Object Oriented Programming and procedural programming.

Procedural programming	Object Oriented Programming
▪ Programs are organized in the form of subroutines or sub programs	▪ Emphasizes on data rather than algorithm
▪ All data items are global	▪ Data abstraction is introduced in addition to procedural abstraction
▪ Suitable for small sized software application	▪ Data and its associated operations are grouped in to single unit
▪ Difficult to maintain and enhance the program code as any change in data type needs to be propagated to all subroutines that use the same data type. This is time consuming.	▪ Programs are designed around the data being operated
▪ Example: **FORTRAN** and **COBOL**.	▪ Relationships can be created between similar, yet distinct data types
	▪ Example: **C++, Java, VB.Net, Python etc.**

2. What are the advantages of OOPs?

Re-usability

"Write once and use it multiple times" you can achieve this by using class.

Redundancy

Inheritance is the good feature for data redundancy. If you need a same functionality in multiple class you can write a common class for the same functionality and inherit that class to sub class.

Easy Maintenance

It is easy to maintain and modify existing code as new objects can be created with small differences to existing ones.

Security

Using data hiding and abstraction only necessary data will be provided thus maintains the security of data.

3 Write a note on the basic concepts that support OOPs?

The Object Oriented Programing has been developed to overcome the drawbacks of procedural and modular programming.

The Object-Oriented Programming approach mainly encourages:

- **Modularisation:** where the program can be decomposed into **modules**.
- **Software re-use:** where a program can be composed from existing and new modules.

Main Features of Object Oriented Programming

- Data Abstraction
- Encapsulation
- Modularity
- Inheritance
- Polymorphism

Encapsulation

The mechanism by which the data and functions are bound together into a single unit is known as **Encapsulation.**

Data Abstraction

Abstraction refers to showing only the essential features without revealing background details

Modularity

Modularity is designing a system that is divided into a set of functional units (named modules) that can be composed into a larger application.

Inheritance

Inheritance is the technique of building new classes **(derived class)** from an existing Class **(base class)**. The most important advantage of inheritance is **code reusability.**

Polymorphism

Polymorphism is the ability of a message or function to be displayed in more than one form.

Classes and objects | CHAPTER 14

PART - I

Choose the correct answer

1. The variables declared inside the class are known as

(A) data **(B) inline** (C) method (D) attributes

2. Which of the following statements about member functions are True or False?

i) A member function can call another member function directly with using the dot operator.

ii) Member function can access the private data of the class.

(A) i-True, ii-True (B) i-False, ii-True **(C) i-True, ii-False** (D) i-False, ii-False

3. A member function can call another member function directly, without using the dot operator called as

(A) sub function (B) sub member

(C) **nesting of member function** (D) sibling of member function

4. The member function defined within the class behave like

(A) inline functions (B) Non inline function

(C) Outline function (D) Data function

5. Which of the following access specifier protects data from inadvertent modifications?

(A) Private (B) Protected (C) Public (D) Global

6.

```
class x
{
        int y;
        public:
        x(int z){y=z;}
} x1[4];
```

```
int main()
{
        x x2(10);
        return 0;
}
```

How many objects are created for the above program?

(A) 10 (B) 14 **(C) 5** (D) 2

7. State whether the following statements about the constructor are True or False.

i) Constructors should be declared in the private section.

ii) Constructors are invoked automatically when the objects are created.

(A) True, True (B) True, False **(C) False, True** (D) False, False

8. Which of the following constructor is executed for the following prototype?

add display(add &); // add is a class name

(A) Default constructor (B) Parameterized constructor

(C) Copy constructor (D) Non Parameterized constructor

PART - II

Answer to all the questions (2 Marks):

1. What are called members?

Members are classified as Data Members and Member functions.

- Data members are the data variables that represent the features or properties of a class.
- Member functions are the functions that perform specific tasks in a class.

2. Differentiate structure and class though both are user defined data type.

The only difference between structure and class is the members of structure are by default **public** where as it is **private in class**.

3. What is the difference between the class and object in terms of oop?

Class	Object
Class is a way to bind the data and its associated functions together.	The class variables are called *object*. Objects are also called as *instance* of class.

4. Why it is considered as a good practice to define a constructor though compiler can automatically generate a constructor?

In the absence of user defined constructor the compiler automatically provides the default constructor. It simply allocates memory for the object.

5. Write down the importance of destructor.

The purpose of the destructor is to free the resources that the object may have acquired during its lifetime. A destructor function removes the memory of an object which was allocated by the constructor at the time of creating a object.

PART - III

Answer to all the questions (3 Marks):

1. Rewrite the following program after removing the syntax errors if any and underline the errors:

Error Program

```
#include<iostream>
#include<stdio.h>
classmystud
{ intstudid =1001;
char name[20];
public
mystud( )
{ }
void register ( )
{cin>>stdid;gets(name);
}
void display ( )
{ cout<<studid<<": "<<name<<endl;}
}
int main( )
{ mystud MS;
register.MS( );
MS.display( );
}
```

Correct Program

```
#include<iostream>
#include<stdio.h>
using namespace std;
class mystud
{
int studid;
char name[20];
public:
mystud()
{
studid=0;
}
void register()
{
cin>>studid;
gets(name);
}
void display()
{
cout<<studid<<" : "<<name<<endl;
}
};
int main()
{
mystud MS;
MS.register1();
MS.display();
return 0;
}
```

2. Write with example how will you dynamically initialize objects?

```
#include<iostream>
using namespace std;
class X
{
int n;
float avg;
public:
X(int p,float q)
{
n=p;
avg=q;
}
void disp()
{
cout<<"\n Roll numbe:- " <<n;
cout<<"\nAverage :- "<<avg;
}
};
int main()
{
int a ; float b;238

cout<<"\nEnter the Roll Number";
cin>>a;
cout<<"\nEnter the Average";
cin>>b;
X x(a,b); // dynamic initialization
x.disp();
return 0;
}
```

Output

```
Enter the Roll Number 1201
Enter the Average 98.6
Roll numbe:- 1201
Average :- 98.6
```

3. What are advantages of declaring constructors and destructor under public accessibility?

A constructor can be defined either in private or public section of a class. But it is advisable to define in public section of a class, so that its object can be created in any function.

4. Given the following C++ code, answer the questions (i) & (ii).

```
class TestMeOut
{
public:
~TestMeOut() //Function 1
{cout<<"Leaving the examination hall"<<endl;}
TestMeOut() //Function 2
{cout<<"Appearing for examination"<<endl;}
void MyWork() //Function 3
{cout<<"Attempting Questions//<<endl;}};
```

(i) In Object Oriented Programming, what is Function 1 referred as and when does it get invoked / called?

It is destructor. When a class object goes out of scope, a special function called the *destructor* gets executed.

(ii) In Object Oriented Programming, what is Function 2 referred as and when does it get invoked / called?

It is constructor. When an instance of a class comes into scope, a special function called the *constructor* gets executed.

PART - IV

Answer to all the questions (5 Marks):

1. Mention the differences between constructor and destructor

Constructor	Destructor
1. The name of the constructor must be same as that of the class	1. The destructor has the same name as that of the class prefixed by the tilde character '~'.
2. A constructor can have parameter list	2. The destructor cannot have arguments
3. The constructor function can be overloaded	3. Destructors cannot be overloaded i.e., there can be only one destructor in a class
4. The constructor is executed automatically when the object is created	4. The destructor is executed automatically when the control reaches the end of class scope to destroy the object
5. They cannot be inherited but a derived class can call the base class constructor	5. They cannot be inherited

2. Define a class RESORT with the following description in C++:

Private members:
Rno // Data member to store room number
Name //Data member to store user name
Charges //Data member to store per day charge
Days //Data member to store the number of days
Compute ( ) // A function to calculate total amount as Days * Charges and if the
//total amount exceeds 11000 then total amount is 1.02 * Days *Charges
Public member:
getinfo( ) // Function to Read the information like name , room no, charges and days
dispinfo ( ) // Function to display all entered details and total amount calculated
//using COMPUTE function

```
#include<iostream>
using namespace std;
class RESORT
{
private:
int rno, days;
float charges;
char name[50];
public:
int compute()
{
if (days * charges > 11000)
return (days * charges * 1.02);
else
return (days * charges);
}
getinfo()
{
cout<< "\n Enter customer name :";
cin>>name;
```

```
cout<< "\n Enter Room Number :";
cin>>rno;
cout<< "\n Enter charges per day:";
cin>>charges;
cout<< "\n Enter Number of days:";
cin>>days;
}
dispinfo()
{
cout<< "\n Room Number:" <<rno;
cout<< "\n Customer name:" <<name;
cout<< "\n Charges per day:" <<charges;
cout<< "\n Number of days:" <<days;
cout<< "\n Total Amount:" <<compute();
}
};
int main()
{
RESORT s;
s.getinfo();
s.dispinfo();
}
```

3. Write the output of the following

```
#include<iostream>
using namespace std;
class student
{
int rno, marks;
public:
student(int r,int m)
{ cout<<"Constructor "<<endl;
rno=r;
marks=m;
}
void printdet()
{
marks=marks+30;
cout<<"Name: Bharathi"<<endl;
cout<<"Roll no : "<<rno<<"\n";
cout<<"Marks : "<<marks<<endl;
}
};
int main()
{
student s(14,70);
s.printdet();
```

```
cout<< "Back to Main";
return 0;
}
```

Output

```
Constructor
Name: Bharathi
Roll no : 14
Marks : 100
Back to Main
```

Polymorphism CHAPTER 15

PART - I

Choose the correct answers

1. Which of the following refers to a function having more than one distinct meaning?
   (A) Function Overloading (B) Member overloading
   (C) Operator overloading (D) Operations overloading
2. Which of the following reduces the number of comparisons in a program?
   (A) Operator overloading (B) Operations overloading
   (C) Function Overloading (D) Member overloading
3. void dispchar(char ch='$',int size=10)

```
{
        for(int i=1;i<=size;i++)
        cout<<ch;
}
```

How will you invoke the function dispchar() for the following input?
To print $ for 10 times
   (A) dispchar(); (B) dispchar(ch,size);
   (C) dispchar($,10); (D)dispchar('$',10 times);

4. Which of the following is not true with respect to function overloading?
(A) The overloaded functions must differ in their signature.
(B) The return type is also considered for overloading a function.
(C) The default arguments of overloaded functions are not considered for Overloading.
(D) Destructor function cannot be overloaded.
5. Which of the following is invalid prototype for function overloading?
(A) void fun (int x);
   void fun (char ch) ;
(B) void fun (int x);
   void fun (int y);
(C) void fun (double d);
   void fun (char ch);
(D) void fun (double d);
   void fun (int y);

PART - II

Answer to all the questions (2 Marks):

1. What is function overloading?

The ability of the function to process the message or data in more than one form is called as function overloading.

2. List the operators that cannot be overloaded.

- scope operator **::**
- sizeof
- member selector **.**
- member pointer selector ***
- ternary operator **?:**

3. class add{int x; public: add(int)}; Write an outline definition for the constructor.

```
add::add()
{
        x=0;
```

}

4. Does the return type of a function help in overloading a function?

The return type of overloaded functions are not considered for overloading same data type.

5. What is the use of overloading a function?

Function overloading is not only implementing polymorphism but also reduces the number of comparisons in a program and makes the program to execute faster. It also helps the programmer by reducing the number of function names to be remembered.

PART - III

Answer to all the questions (3 Marks):

1. What are the rules for function overloading?

- ✓ The overloaded function must differ in the number of its arguments or data types
- ✓ The return type of overloaded functions are not considered for overloading same data type.
- ✓ The default arguments of overloaded functions are not considered as part of the parameter list in function overloading.

2. How does a compiler decide as to which function should be invoked when there are many functions? Give an example.

The number and types of a function's parameters are called the **function's signature.** When you call an overloaded function, the compiler determines the most appropriate definition to use, by comparing the argument types you have used to call the function with the parameter types specified in the definitions. The process of selecting the most appropriate overloaded function or operator is called **overload resolution.**

Ex.

```
float area ( float radius);
float area ( float half, float base, float height );
float area ( float length , float breadth);
```

3. What is operator overloading? Give some example of operators which can be overloaded.

- ✓ The mechanism of giving special meaning to an operator is known as operator overloading.
- ✓ The term operator overloading, refers to giving additional functionality to the normal C++ operators like +,++,-,—,+=,-=,*.<,>.

4. Discuss the benefit of constructor overloading?

A class can have more than one constructor with different signature. Constructor overloading provides flexibility of creating multiple type of objects for a class.

5. class sale (int cost, discount ;public: sale(sale &); Write a non-inline definition for constructor specified;

```
sale::(sale &s)
{
        cost = s.cost;
        discount = s.discount;
}
```

PART - IV

Answer to all the questions (5 Marks):

1. What are the rules for operator overloading?

1. Precedence and Associativity of an operator cannot be changed.
2. No new operators can be created, only existing operators can be overloaded.
3. Cannot redefine the meaning of an operator's procedure. You cannot change how integers are added. Only additional functions can be to an operator
4. Overloaded operators cannot have default arguments.
5. When binary operators are overloaded, the left hand object must be an object of the relevant class

2. Answer the question (i) to (v) after going through the following class.

```
classBook
{
Int BookCode ; char Bookname[20];float fees;
public:
Book( ) //Function 1
{
fees=1000;
BookCode=1;
strcpy (Bookname,"C++");
}
void display(float C) //Function 2
{
cout<<BookCode<<":"<<Bookname<<":"<<fees<<endl;
}
~Book( ) //Function 3
{
cout<<"End of Book Object"<<endl;
}
Book (int SC, char S[ ],float F) ; //Function 4
};
```

(i) In the above program, what are Function 1 and Function 4 combined together referred as?

Constructor

(ii) Which concept is illustrated by Function3? When is this function called/ invoked?

Destructor, The destructor is executed automatically when the control reaches the end of class scope.

(iii) What is the use of Function3?

A destructor function removes the memory of an object which was allocated by the constructor at the time of creating a object.

(iv) Write the statements in main to invoke function1 and function2

```
int main()
{
        Book b;
        b.display(5.4);
}
```

(v) Write the definition for Function4.

```
Book(int SC, char S[ ],float F)
{
```

```
        BookCode=SC;
        Bookname=S;
        Fees=F;
}
```

3. Write the output of the following program

```
include<iostream>
using namespace std;
class Seminar
{
int Time;
public:
Seminar()
{
Time=30;cout<<"Seminar starts now"<<endl;
}
void Lecture()
{
cout<<"Lectures in the seminar on"<<endl;
}
Seminar(int Duration)
{
Time=Duration;cout<<"Welcome to Seminar "<<endl;
}
Seminar(Seminar &D)
{
Time=D.Time;cout<<"Recap of Previous Seminar Content "<<endl;
}
~Seminar()
{
cout<<"Vote of thanks"<<endl;
}
};
int main()
{
Seminar s1,s2(2),s3(s2);
s1.Lecture();
return 0;
}
```

Output:

Seminar starts now
Welcome to Seminar
Recap of Previous Seminar Content
Lectures in the seminar on
Vote of thanks

4. Answer the questions based on the following program

```
#include<iostream>
#include<string.h>
using namespace std;
class comp
{
public:
chars[10];
void getstring(char str[10])
{
```

```
strcpy(s,str);
}
void operator==(comp);
};
void comp::operator==(comp ob)
{
if(strcmp(s,ob.s)==0)
cout<<"\nStrings are Equal";
else
cout<<"\nStrings are not Equal";
}
int main()
{
comp ob, ob1;
char string1[10], string2[10];
cout<<"Enter First String:";
cin>>string1;
ob.getstring(string1);
cout<<"\nEnter Second String:";
cin>>string2;
ob1.getstring(string2);
ob==ob1;
return 0;
}
```

(i) Mention the objects which will have the scope till the end of the program.

ob

(ii) Name the object which gets destroyed in between the program

ob1

(iii)Name the operator which is over loaded and write the statement that invokes it.

== → Operator is overloaded

ob==ob1; → statement invokes

(iv) Write out the prototype of the overloaded member function

void comp::operator==(comp ob)

(v)What types of operands are used for the overloaded operator?

Object of class(ob)

(vi) Which constructor will get executed? Write the output of the program

Default constructor generated by compiler.

Output

Enter First String: rose
Enter Second String: mahi
Strings are not Equal

Inheritance | CHAPTER 16

PART-I

Choose the correct answer

1. Which of the following is the process of creating new classes from an existing class?
   (a) Polymorphism **(b) Inheritance** (c) Encapsulation (d) super class
2. Which of the following derives a class student from the base class school?
   (a) school: student **(b) class student : public school**
   (c) student : public school (d) class school : public student
3. The type of inheritance that reflects the transitive nature is
   (A) Single Inheritance (B) Multiple Inheritance
   (C) Multilevel Inheritance (D) Hybrid Inheritance
4. Which visibility mode should be used when you want the features of the base class to be available to the derived class but not to the classes that are derived from the derived class?
   (A) Private (B) Public (C) Protected (D) All of these
5. Inheritance is process of creating new class from
   (A) Base class (B) abstract (C) derived class (D) Function
6. A class is derived from a class which is a derived class itself, then this is referred to as
   (A) multiple inheritance **(B) multilevel inheritance**
   (C) single inheritance (D) double inheritance
7. Which amongst the following is executed in the order of inheritance?
   (A) Destructor (B) Member function **(C) Constructor** (D) Object
8. Which of the following is true with respect to inheritance?
   (A) Private members of base class are inherited to the derived class with private
   (B) Private members of base class are not inherited to the derived class with private accessibility
   (C) Public members of base class are inherited but not visible to the derived class
   (D) Protected members of base class are inherited but not visible to the outside class.
9. Based on the following class declaration answer the questions (from9.1 o 9.5)

```
class vehicle
{ int wheels;
public:
void input_data(float,float);
void output_data();
protected:
int passenger;
};
class heavy_vehicle : protected vehicle {
int diesel_petrol;
protected:
int load;
public:
void read_data(float,float)
```

```
void write_data(); };
class bus: private heavy_vehicle {
char Ticket[20];
public:
void fetch_data(char);
void display_data(); };
};
```

9.1. Which is the base class of the class heavy_vehicle?

(a) Bus (b) heavy_vehicle **(c) vehicle** (d) both (a) and (c)

9.2. The data member that can be accessed from the function displaydata()

(a) passenger (b) load (c) Ticket **(d) All of these**

9.3. The member function that can be accessed by an objects of bus Class is

(a) input_data(), output_data() (b) read_data(), write_data()

(c) fetch_data(), display_data() (d) All of these

9.4. The member function that is inherited as public by Class Bus

(a) input_data(),output_data() (b) read_data(), write_data()

(c) fetch_data(),display_data() **(d) none of these**

PART - II

Answer to the all qustions (2 Marks):

1. What is inheritance?

The mechanism of deriving new class from an existing class is called inheritance.

2. What is a base class?

The class to be inherited is called base class or parent class and the class which inherits the other class is called derived class or child class.

3. Why derived class is called power packed class?

The derived class is a power packed class, as it can add additional attributes and methods and thus enhance its functionality.

4. In what multilevel and multiple inheritance differ though both contains many base class?

- When a derived class inherits from multiple base classes it is known as multiple inheritance.
- When a class is derived from a class which is a derived class.

5. What is the difference between public and private visibility mode?

Public	Private
A public member is accessible from anywhere outside the class but within a program.	A private member cannot be accessed from outside the class. Only the class member functions can access private members.

PART - III

Answer to the all questions (3 Marks):

1. What are the points to be noted while deriving a new class?

I. The keyword class has to be used

II. The name of the derived class is to be given after the keyword class

III. A single colon

IV. The type of derivation (the visibility mode), namely private, public or protected. If no visibility mode is specified, then by default the visibility mode is considered as private.

V. The names of all base classes (parent classes) separated by comma.

2. What is difference between the members present in the private visibility mode and the members present in the public visibility mode

Public	Private
When a base class is inherited with public visibility mode, the protected and public members of the base class will be inherited as protected and public members of derived class.	When a base class is inherited with private visibility mode the public and protected members of the base class become 'private' members of the derived class

3. What is the difference between polymorphism and inheritance though are used for reusability of code?

- Polymorphism is the ability of a message or function to be displayed in more than one form.
- It is a process of creating new classes called derived classes, from the existing or base classes.

4. What do you mean by overriding?

When a derived class member function has the same name as that of its base class member function, the derived class member function shadows/hides the base class's inherited function. This situation is called function overriding and this can be resolved by giving the base class name followed by :: and the member function name.

5. Write some facts about the execution of constructors and destructors in inheritance.

- Base class constructors are executed first ,before the derived class constructors execution
- Derived class cannot inherit the base class constructor but it can call the base class constructor by using

  Base_class name::base_class_constructor() in derived class definition
- If there are multiple base classes ,then its start executing from the left most base class
- In multilevel inheritance, the constructors will be executed in the order of inheritance.

PART - IV

Answer to the all questions (5 Marks):

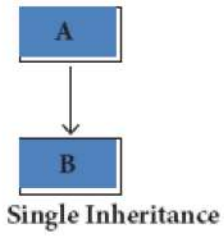
1. Explain the different types of inheritance.

There are different types of inheritance viz.,

1. Single Inheritance
2. Multiple Inheritance
3. Multilevel Inheritance
4. Hybrid Inheritance
5. Hierarchical Inheritance

Single Inheritance

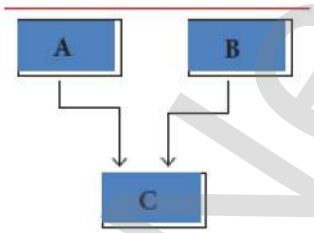
When a derived class inherits only from one base class, it is known as single inheritance.



Single Inheritance

Multiple Inheritance

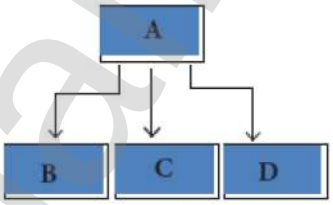
When a derived class inherits from multiple base classes it is known as multiple inheritance



Multiple Inheritance

Hierarchical Inheritance

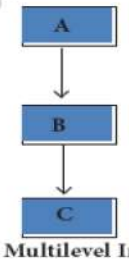
When more than one derived classes are created from a single base class, it is known as Hierarchical inheritance.



Hierarchical Inheritance

Multilevel Inheritance

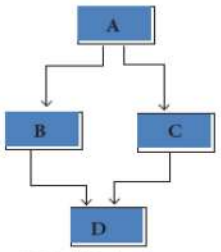
The transitive nature of inheritance is itself reflected by this form of inheritance. When a class is derived from a class which is a derived class – then it is referred to as multilevel inheritance.



Multilevel In

Hybrid inheritance

When there is a combination of more than one type of inheritance, it is known as hybrid inheritance.



Hybrid Inheritance

Example

```
# include <iostream>
using namespace std;
class student //base class
{
private :
char name[20];
int rno;
public:
void acceptname()
{
cout<<"\n Enter roll no and name .. ";
cin>>rno>>name;
```

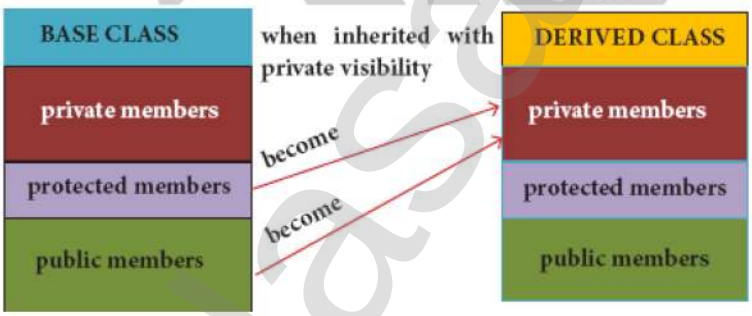
```
}
void displayname()
{
cout<<"\n Roll no :"<<rno;
cout<<"\n Name :"<<name<<endl;
}
};
class exam : public student //derived
class with single base class
{
public:
int mark1,mark2;
void acceptmark()
{
cout<<"\n Enter lang,eng marks.. ";
cin>>mark1>>mark2;
}
void displaymark()
{
        cout<<"\n\t\t Marks Obtained ";
        cout<<"\n Language.. "<<mark1;
        cout<<"\n English .. "<<mark2;
}
};
int main()
{
        exam e1;
        e1.acceptname();
        e1.acceptmark();
        e1.displayname();
        e1.displaymark();
        return 0;
}
```

2. Explain the different visibility mode through pictorial representation

An important feature of Inheritance is to know which member of the base class will be acquired by the derived class. This is done by using visibility modes. The accessibility of base class by the derived class is controlled by visibility modes. The three visibility modes are private, protected and public.

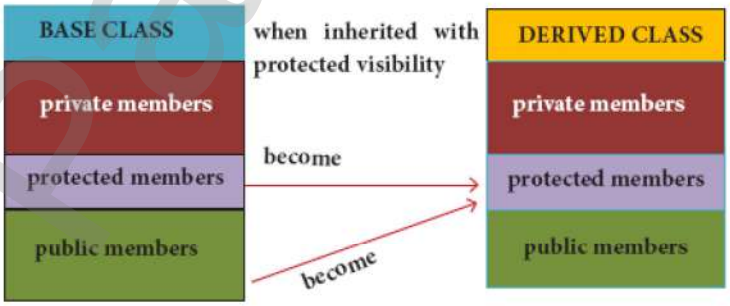
Private visibility mode

When a base class is inherited with private visibility mode the public and protected members of the base class become 'private' members of the derived class



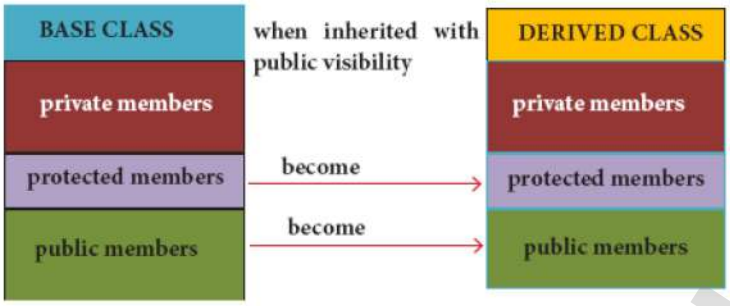
Protected visibility mode

When a base class is inherited with protected visibility mode the protected and public members of the base class become 'protected members' of the derived class



Public visibility mode

When a base class is inherited with public visibility mode, the protected members of the base class will be inherited as protected members of the derived class and the public members of the base class will be inherited as public members of the derived class.



3. Consider the following c++ code and answer the questions

```
class Personal
{
int Class, Rno;
char Section;
protected:
char Name[20];
public:
personal();
void pentry();
void Pdisplay();
};
class Marks:private Personal
{
float M[5];
protected:
char Grade[5];
public:
Marks();
void M entry();
void M display();
};
class Result:public Marks
{
float Total,Agg;
public:
char FinalGrade, Commence[20];
Result();
void R calculate();
void R display();
}:
```

3.1. Which type of Inheritance is shown in the program?

Multilevel Inheritance

3.2. Specify the visibility mode of base classes.

Marks – public Visibility Mode
Personal – private Visibility Mode

3.3 Give the sequence of Constructor/Destructor Invocation when object of class Result is created.

Constructor - Personal, Marks, Result
Destructor - Result, Marks, Personal

3.4. Name the base class(/es) and derived class (/es).

Base Class - Personal
Derived Classes – Marks, Result

3.5 Give number of bytes to be occupied by the object of the following class:

(a) Personal - 25 Bytes
(b) Marks - 25 Bytes
(c) Result - 29 Bytes

3.6. Write the names of data members accessible from the object of class Result.

Total, Agg, name, grade

3.7. Write the names of all member functions accessible from the object of class Result.

Rcalculate();
Rdisplay();
Mentry();
Mdisplay();

3.8 Write the names of all members accessible from member functions of class Result.

Total, Agg, name, grade

4. Write the output of the following program

```
#include<iostream>
using namespace std;
class A
{
protected:
int x;
public:
void show()
{
cout<<"x = "<<x<<endl;
}
A()
{
cout<<endl<<" I am class A "<<endl;
}
~A()
{
cout<<endl<<" Bye ";
}
};
class B : public A
{
protected:
```

```
int y;
public:
B(int x, int y)
{
this->x = x; //this -> is used to denote the objects datamember
this->y = y; //this -> is used to denote the objects datamember
}
B()
{
cout<<endl<<" I am class B "<<endl;
}
~B()
{
cout<<endl<<" Bye ";
}
void show()
{
cout<<"x = "<<x<<endl;
cout<<"y = "<<y<<endl;
}
};
int main()
{
A objA;
B objB(30, 20);
objB.show();
return 0;
}
```

Output

I am class A
I am class B
x = 30
y = 20
Bye
Bye

5. Debug the following program

Output

```
-------------
15
14
13
```

Error Program

```
%include(iostream.h)
#include<conio.h>
Class A
{
public;
int a1,a2:a3;
Void getdata[]
{
a1=15;
a2=13;a3=13;
}
}
Class B:: public A()
{
PUBLIC
voidfunc()
{
int b1:b2:b3;
A::getdata[];
b1=a1;
b2=a2;
a3=a3;
cout<<b1<<'\t'<<b2<<'t\'<<b3;
}
void main()
{
clrscr()
B der;
der1:func();
getch();
}
```

Correct Program

```
#include<iostream>
using namespace std;
class A
{
public:
int a1,a2,a3;
void getdata()
{
a1=15;
a2=14;
a3=13;
}
};
class B:public A
{
public:
void func()
{
int b1,b2,b3;
A::getdata();
b1=a1;
b2=a2;
b3=a3;
cout<<b1<<'\n'<<b2<<'\n'<<b3;
}
};
int main()
{
B der;
der.func();
return 0;
}
```

PART - I

Choose the correct Answer

1. Which of the following deals with procedures, practices and values?
   A) piracy B) programs C) virus **D) computer ethics**
2. Commercial programs made available to the public illegally are known as
   A) freeware **B) warez** C) free software D) software
3. Which one of the following are self-repeating and do not require a computer program to attach themselves?
   A) viruses **B) worms** C) spyware D) Trojans
4. Which one of the following tracks a user visits a website?
   A) spyware **B) cookies** C) worms D) Trojans
5. Which of the following is not a malicious program on computer systems?
   A) worms B) Trojans C) spyware **D) cookies**
6. A computer network security that monitors and controls incoming and outgoing traffic is
   A) Cookies B) Virus **C) Firewall** D) worms
7. The process of converting cipher text to plain text is called
   A) Encryption **B) Decryption** C) key D) proxy server
8. e-commerce means
   A) electronic commerce B) electronic data exchange
   C) electric data exchange D) electronic commercialization.
9. Distributing unwanted e-mail to others is called.
   A) scam **B) spam** C) fraud D) spoofing
10. Legal recognition for transactions are carried out by
    A) Electronic Data Interchange B) Electronic Data Exchange
    C) Electronic Data Transfer D) Electrical Data Interchange

PART - II

Answer to the following questions (2 Marks)

1. What is harvesting?

A person or program collects login and password information from a legitimate user to illegally gain access to others' account(s).

2. What are Warez?

Commercial programs that are made available to the public illegally are often called warez.

3. Write a short note on cracking.

Cracking is where someone edits a program source so that the code can be exploited or modified. A cracker is a malicious or criminal hacker. "Cracking" means trying to get into computer systems in order to steal, corrupt, or illegitimately view data.

4. Write two types of cyber attacks.

- **Worms** are self- repeating and do not require a computer program to attach themselves. Worms continually look for vulnerabilities and report back to the author of the worm when weaknesses are discovered.

- **Spyware** can be installed on the computer automatically when the attachments are open, by clicking on links or by downloading infected software.

5. What is a Cookie?

A cookie is a small piece of data sent from a website and stored on the user's computer memory (Hard drive) by the user's web browser while the user is browsing internet.

PART - III

Answer to the following questions (3 Marks)

1. What is the role of firewalls?

- A firewall is a computer network security based system that monitors and controls incoming and outgoing network traffic based on predefined security rules.
- A firewall commonly establishes a block between a trusted internal computer network and entrusted computer outside the network.

2. Write about encryption and decryption.

- Encryption is the process of translating the plain text data (plaintext) into random and mangled data (called cipher-text).
- Decryption is the reverse process of converting the cipher-text back to plaintext.
- Encryption and decryption are done by cryptography.

3. Explain about proxy server.

A proxy server acts as an intermediary between the end users and a web server. A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resources available from a different server.

The proxy server examines the request, checks authenticity and grants the request based on that. Proxy servers typically keep the frequently visited site addresses in its cache which leads to improved response time.

4. What are the guidelines to be followed by any computer user?

- ✓ Complex password setting can make your surfing secured.
- ✓ When the internet is not in use, disconnect it.
- ✓ Do NOT open spam mail or emails that have an unfamiliar sender.
- ✓ When using anti-virus software, keep it up-to-date.

5. What are ethical issues? Name some.

An Ethical issue is a problem or issue that requires a person or organization to choose between alternatives that must be evaluated as right (ethical) or wrong (unethical).

Some Ethical issues are.

- ✓ Cyber crime
- ✓ Software Piracy
- ✓ Unauthorized Access
- ✓ Hacking

PART - IV

Answer to the following questions (5 Marks)

1. What are the various crimes happening using computer?

Crime	Function
Crime Function	Hacking, threats, and blackmailing towards a business or a person.
Cyber stalking	Harassing through online.
Malware	Malicious programs that can perform a variety of functions including stealing, encrypting or deleting sensitive data, altering or hijacking core computing functions and monitoring user's computer activity without their permission.
Denial of service attack	Overloading a system with fake requests so that it cannot serve normal legitimate requests.
Fraud	Manipulating data, for example changing the banking records to transfer money to an unauthorized account.
Harvesting	A person or program collects login and password information from a legitimate user to illegally gain access to others' account(s).
Identity theft	It is a crime where the criminals impersonate individuals, usually for financial gain.
Intellectual property theft	Stealing practical or conceptual information developed by another person or company.
Salami slicing	Stealing tiny amounts of money from each transaction.
Scam	Tricking people into believing something that is not true.
Spam	Distribute unwanted e-mail to a large number of internet users.
Spoofing	It is a malicious practice in which communication is send from unknown source disguised as a source known to the receiver.

2. What is piracy? Mention the types of piracy? How can it be prevented?

Software Piracy is about the copyright violation of software created originally by an individual or an institution. It includes stealing of codes / programs and other information illegally and creating duplicate copies by unauthorized means and utilizing this data either for one's own benefit or for commercial profit.

In simple words, Software Piracy is ***"unauthorized copying of software"***

Types of Piracy

- Duplicating and selling copyrighted programs.
- Downloading software illegally through network.

To Prevent

- Illegal copying and distribution of commercial software should not be practiced.
- An entirely different approach to software piracy is called shareware, acknowledges the futility of trying to stop people from copying software and instead relies on people's honesty.
- Commercial programs that are made available to the public illegally are often called warez.

3. Write the different types of cyber attacks.

S.No.	Cyber Attack	Function
1.	Virus	A virus is a small piece of computer code that can repeat itself and spreads from one computer to another by attaching itself to another computer file.
2.	Worms	Worms are self- repeating and do not require a computer program to attach themselves. Worms continually look for vulnerabilities and report back to the author of the worm when weaknesses are discovered.
3.	Spyware	Spyware can be installed on the computer automatically when the attachments are open, by clicking on links or by downloading infected software.
4.	Ransomware	Ransomware is a type of malicious program that demands payment after launching a cyber-attack on a computer system. This type of malware has become increasingly popular among criminals and costs the organizations millions each year.

Answer to the following questions

1. List of the search engines supporting Tamil.

- Google and Bing provide searching facilities in Tamil, which means you can search everything through Tamil.
- A Google search engine gives you an inbuilt Tamil virtual keyboard.

2. What are the keyboard layouts used in Android?

Sellinam *and* ***Ponmadal*** are familiar Tamil keyboard layouts that work on Android operating system in Smart phone using phonetics.

3. Write a short note about Tamil Programming Language.

Based on Python programming language, the first Tamil programming language "Ezhil" (எழில்) is designed. With the help of this programming language, you can write simple programs in Tamil.

4. What TSCII?

TSCII (Tamil Script Code for Information Interchange) is the first coding system to handle our Tamil language in an analysis of an encoding scheme that is easily handled in electronic devices, including non-English computers.

5. Write a short note on Tamil Virtual Academy.

With the objectives of spreading Tamil to the entire world through internet, Tamil Virtual University was established on 17th February 2001 by the Govt. of Tamilnadu. Now, this organisation functioning with the name "Tamil Virtual Academy". This organisation offers different courses regarding Tamil language, Culture, heritage etc., from kindergarten to under graduation level.