XI– COMPUTER SCIENCE

Name **:**

Class **:** **Sec :**

School **:**

INDEX

1. INTRODUCTION TO COMPUTER
PART-I

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, flex board, etc.
   (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

VERY SHORT ANSWERS:

1. What is a Computer?
❖ A computer is an electronic device that processes the input according to the set of instructions provided to it and gives the desired output at a very fast rate

2. Distinguish between Data and Information.

Data	Information
Data is defined as an unprocessed collection of raw facts, suitable for communication, interpretation or processing.	Information is a collection of facts from which conclusions may be drawn.
Example: 134, 16, 'Kavitha', 'C'	**Example:** Kavitha is 16 years old.

3. What are the components of the CPU?
❖ Control Unit
❖ Arithmetic and Logic Unit (ALU) and
❖ Memory Unit

4. What is the function of an ALU?
❖ 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

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❖ The logical operations of ALU promote the decision-making ability of a computer.

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 Memory Unit is of two types are,

❖ **Primary Memory:** The primary memory is used to temporarily store the programs and data when the instructions are ready to execute.

❖ **Secondary Memory:** The secondary memory is used to store the data permanently.

7. **Differentiate Input and Output unit.**

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

8. **Distinguish Primary and Secondary memory.**

Primary Memory	Secondary Memory
The **Primary Memory** is volatile, that is, the content is lost when the power supply is switched off.	The **Secondary memory** is non-volatile, that is, the content is available even after the power supply is switched off.
The Random Access Memory (RAM) is example of a main memory.	Hard disk, CD-ROM and DVD ROM are examples of secondary memory.

PART-III

SHORT ANSWERS:

1. **What are the Characteristics of Computer?**
> Speed
> Accuracy
> Consistency
> Flexibility
> Diligence
> Storage Capacity

2. **Write the applications of computer.**
The various applications of computers in today's are:
✓ Business
✓ Education
✓ Marketing
✓ Banking
✓ Insurance
✓ Communication
✓ Health Care

- ✓ Military
- ✓ Engineering Design

3. What is input device? Give two examples.

Input device 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, Scanner, Fingerprint scanner, Track Ball, Retinal Scanner, Light pen etc.

4. Name any three output devices.

Monitor, Printer, Plotter, Speaker, Multimedia Projectors are the output devices.

5. Differentiate optical and Laser Mouse.

Optical Mouse	Laser Mouse
It uses light source to judge the motion of the pointer.	Laser Mouse uses Laser Light instead of a light source.
Optical mouse is less sensitive towards surface.	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 are impact 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.

- ❖ Monitor is the most commonly used output device to display the information.
- ❖ 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 colour, which display results in multiple colours.
- ❖ 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.
- ❖ The video graphics card helps the keyboard to communicate with the screen.
- ❖ It acts as an interface between the computer and display monitor.
- ❖ Usually the recent motherboards incorporate.

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.
- It accepts binary data as input process the data according to the instructions and provides the result as output.
- 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.
- The secondary memory is used to store the data permanently
- The Primary Memory is volatile; the Random Access Memory (RAM) is an example of a main memory.
- The Secondary memory is non-volatile.
- Hard Disk, CDROM and VD ROM are examples of secondary memory.
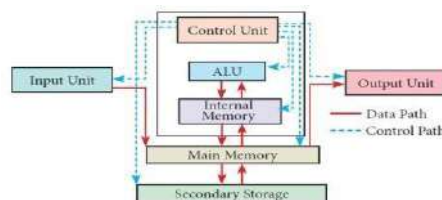

Fig: Components of a Computer

2. **Discuss the various generations of computers.**

- ❖ First generation -1940- 1956(VACCUM TUBES)
- ❖ Second generation -1956-1964 (TRANSISTORS)
- ❖ Third generation -1964-1971 (INTEGRATED CIRCUIT)
- ❖ Fourth generation -1971-1980 (MICROPROCESSOR)
- ❖ Fifth generation -1980 to till date (ULTRA LARGE SCALE INTEGRATION)

❖ Sixth generation - IN FUTURE.

Generation & Period	Main Component Used	Merits/Demerits
First Generation (1940-1956)	Vacuum tubes	- Big in size - Consumed more power - Malfunction due to overheat - Machine Language was used.
Second Generation (1956-1964)	Transistors	- Smaller compared to First Generation. - Generated Less Heat. - Consumed less power when 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.
Third Generation (1964-1971)	Integrated Circuits (IC)	- Computers were smaller, faster and more reliable. - Consumed less power. - High Level Languages were used.
Fourth Generation (1971-1980)	Microprocessor Very Large Scale Integrated Circuits (VLSI)	- Smaller and Faster. - Microcomputer series such as IBM and APPLE were developed. - Portable Computers were introduced.
Fifth Generation (1980 - till date)	Ultra Large Scale Integration (ULSI)	- Parallel processing - Super conductors - Computer size was drastically reduced - Can recognize images and

		graphics • Introduction of artificial intelligence and expert system • Able to solve high complex problems including decision making and logical reasoning
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.

3. EXPLAIN THE FOLLOWING
a) Inkjet printer
b) Multimedia projector
c) Barcode/QR code reader

a) Inkjet printer:

Inkjet printers use color cartridges which combined magenta, yellow and cyan inks to create color tones. A black cartridges is also used for monochrome output. Inkjet printers work by spraying ionized ink at a sheet of paper. The speed of inkjet printer range from 1-20 PPM (Pages Per Minute).
They use the technology of firing ink by heating it so that it explodes towards the paper in bubbles or by using piezoelectricity in which tiny electric currents controlled by electronic circuits are used inside the printer to spread ink in jet speed. An inkjet printer can spread millions of dots of ink at the paper every single second.

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) Barcode/QR code reader

A Bar code is a pattern printed in lines of different thickness. The bar code reader

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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 interpret the image.

2. NUMBER SYSTEM
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 Kilo Byte 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 , the equivalent Hexadecimal equivalent is?

    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

VERY SHORT ANSWERS:

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.**
   - • **This is for negative numbers only i.e. the number whose MSB is 1**

    Step 1: Convert given Decimal number into Binary

    Step 2: Check if the binary number contains 8 bits, if less add 0 at the left most bit, to make it as 8 bits.

    Step 3: Invert all bits (i.e. Change 1 as 0 and 0 as 1)

    Example: Find 1's complement for $(-24)_{10}$

Given Number	Binary Number	1's Compliment
$(-24)_{10}$	00011000	11100111

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

$$46 / 2 = 23 + 0 \quad \text{MSB}$$
$$23 / 2 = 11 + 1$$
$$11 / 2 = 5 + 1$$
$$5 / 2 = 2 + 1$$
$$2 / 2 = 1 + 0$$

LSB

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

4. **We cannot find 1's complement for $(28)_{10}$. State reason.**
   - ❖ $(28)_{10}$ is positive number.
   - ❖ 1's Complement represents signed numbers (Negative numbers) only. So, $(28)_{10}$ cannot find 1's complement.
5. **List the encoding systems that represents 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
   - ❖ Unicode

PART-III

SHORT ANSWERS:

1. **What is radix of a number system? Give example**
   - ❖ A numbering system is a way of representing numbers. Each number system is uniquely identified by its **base value** or **radix**. Radix or base is the count of number of digits in each number system.
   - ❖ Radix or base is the general idea behind positional numbering system.
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 in the binary number is called as 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.**

   $150 / 2 = 75 + 0$ **MSB**
   $75 / 2 = 37 + 1$
   $37 / 2 = 18 + 1$
   $18 / 2 = 9 + 0$
   $9 / 2 = 4 + 1$
   $4 / 2 = 2 + 0$
   $2 / 2 = 1 + 0$

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

   LSB

   $= 010 \quad 010 \quad 110$
   $= \quad 2 \qquad 2 \qquad 6$

   $$(10010110)_2 = (226)_8$$

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

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

PART-IV

EXPLAIN IN DETAIL:

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

The method of **repeated multiplication by 2** has to be used to convert such kind of decimal fractions.

The steps involved in the method of **repeated multiplication by 2**:

Step 1: Multiply the decimal fraction by 2 and note the integer part. The integer part is either 0 or 1.

Step 2: 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).

Step 3: The resulting integer part forms a sequence of 0s and 1s that become the binary equivalent of decimal fraction.

Step 4: The final answer is to be written from first integer part obtained till the last integer part obtained.

Write the integer parts from top to bottom to obtain the equivalent fractional binary number. Hence,

$$(0.2)_{10}=(0.00110011\ldots)_2 = (0.00110011)_2$$

b. Convert $(98.46)_{10}$ to Binary

1. Integer part

2	98
2	49 – 0
2	24 – 1
2	12 – 0
2	6 – 0
2	3 – 0
	1 – 1

2. Fractional part

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

$$(98.46)_{10} = (1100010.01110\ldots..)_2$$

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

a) -98

2	98
2	49 – 0
2	24 – 1
2	12 – 0
2	6 – 0
2	3 – 0
	1 – 1

$= 98_{10} = 1100010$

8 bit format of 98_{10}	=	01100010
1's complement	=	10011101
Add 1 bit	=	+1
2's complement	=	10011110

b) -135

2	135
2	67 – 1
2	33 – 1
2	16 – 1
2	8 – 0
2	4 – 0
2	2 – 0
	1 – 0

$135_{10} = 10000111$

1's complement	=	01111000
Add 1 bit	=	+1
2's complement	=	01111001
		11

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

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  1101010
+  101101
-------------------
 10010111
-------------------
```

b) Subtract $1101011_2 - 111010_2$

```
  1101011
-  111010
--------------
  110001
--------------
```

PART-II-BOOLEAN ALGEBRA

I. CHOOSE THE BEST ANSWER

1. Which is the 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) 0

4. NOR is the 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

Very Short answers

1. What is Boolean algebra?

Boolean algebra is 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. 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". In other words the output of the NAND gate is 0 if and only if both the inputs are 1, otherwise the output is 1.

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 associate 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

Short Answers.

1.Write the truth table of fundamental gates.

AND GATE:

Input		Output
A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

OR GATE:

Input		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

NOT GATE

Input	Output
0	1
1	0

2.Write the 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. In simple words, the output is 1 if the input are the same, otherwise the output is 0.

3.Reason out why the NAND and NOR are called universal gate?

  NAND and XOR gates are called Universal gates, because the 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

$\overline{A + B} = \overline{A}.\overline{B}$

$\overline{A.B} = \overline{A} + \overline{B}$

PART-IV

Explain in detail

1.Explain the fundamental gates with expression and truth table

AND gate:

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". In other words the output will be 1 if and only if both inputs are 1; otherwise the output is 0. The output of the AND gate is represented by avariable say C, where A and B are two boolean variables. In Boolean algebra, a variable can take either of the values '0' or '1'. The logical symbol of the AND gate is
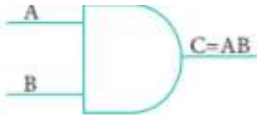
One way to symbolize the action of an AND gate is by writing the boolean function.

C = A AND B

In boolean algebra the multiplication sign stands for the AND operation.

Therefore, the output of the AND gate is

C = A . B or

simply C = AB

Read this as "C equals A AND B". Since there are two input variables here, the truth table has four entries, because there are four possible inputs : 00, 01, 10 and 11. For instance if both inputs are 0,

C = A . B

$\quad$ = 0 . 0

$\quad$ = 0

The truth table for AND Gate is

Input		Output
A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

OR GATE:

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". If both inputs are "false" then the output is "false". In otherwords the output will be 1 if and only if one or both inputs are 1; otherwise, the output is 0. The logical symbol of the OR gate is

The OR gate output is

C = A OR B

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We use the + sign to denote the OR function. Therefore,

$C = A + B$

Read this as "C equals A OR B".

For instance, if both the inputs are 1

$C = A + B = 1 + 1 = 1$

The truth table for OR gate is

Input		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

NOT GATE:

The NOT gate, called a logical inverter, has only one input. It reverses the logical state. In other words the output C is always the complement of the input. The logical symbol of the NOT gate is

The boolean function of NOT gate is

$C = NOT A$

In boolean algerbra, the over bar stands for NOT operation. Therefore,

$C = \bar{A}$

Read this as "C equals NOT A" or "C equals the complement of A".

If A is 0,

$C = \bar{0} = 1$

Input	Output
A	C
1	0
0	1

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

The logic circuit of bubbled OR gate is

$C = \bar{A} + \bar{B}$
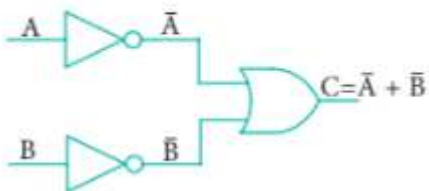
The output of this circuit can be written as $C = A + B$ The above circuit can be redrawn as the bubbles on the input, where the bubbles represents the inversion.

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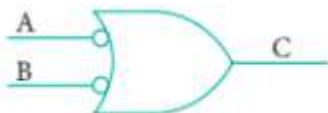
We refer this as bubbled OR gate. The truth table for the bubbled OR is

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

If we compare the truth tables of the bubbled OR gate with NAND gate, they are identical. So the circuits are interchangeable.

Therefore,

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

BUBBLED AND GATE:

The Logic Circuit of Bubbled AND Gate
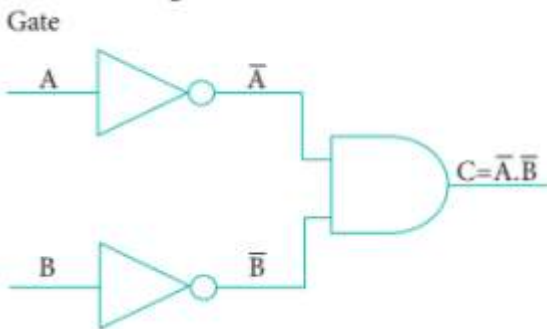
In the above circuit, invertors on the input lines of the AND gate gives the output as

$C = (A \cdot B)$

This circuit can be redrawn as the bubbles on the inputs, where the bubbles represent inversion.

We refer this as bubbled AND gate. Let us analyse this logic circuit for all input possiblities.

If A = 0 and B = 0 $C = (\overline{0} \cdot \overline{0}) = 1.1 = 1$

If A = 0 and B = 1 $C = (\overline{0} \cdot \overline{1}) = 1.0 = 0$

If A = 1 and B = 0 $C = (\overline{1} \cdot \overline{0}) = 0.1 = 0$

If A = 1 and B = 1 $C = (\overline{1} \cdot \overline{1}) = 0.0 = 0$

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

You can see that, a bubbled AND gate produces the same output as a NOR gate. So, You can replace each NOR gate by a bubbled AND gate. In other words the circuits are interchangeable.

Therefore

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

3. Explain the derived gates with expression and truth table

NAND GATE:

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". In otherwords the output of the NAND gate is 0 if and only if both the inputs are 1, otherwise the output is 1.

The logic circuit of NAND gate is
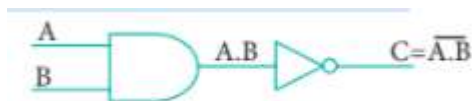
The logical symbol of NAND gate is

The output of the NAND gate is

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

Read this as "C" equals NOT of A AND B" or "C" equals the complement of A AND B".

For example if both the inputs are 1

$$C = \overline{(1 \cdot 1)} = \overline{1} = 0$$

The truth table for NAND gate is

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

NOR GATE:

The NOR gate circuit is an OR gate followed by an inverter. Its output is "true" if both inputs are "false" Otherwise, the output "false". In other words, the only way to get '1' as output is to have both inputs '0'. Otherwise the output is 0. The logic circuit of the NOR gate is

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The output of NOR gate is

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

Read this as "C equals NOT of A OR B" or "C equals the complement of A OR B".

For example if both the inputs are 0,

$$C = (\overline{0 + 0}) = \overline{0} = 1$$

The truth table for NOR gate is

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

XOR gate:

The XOR (exclusive - OR) gate acts in 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." Another way of looking at this circuit is to observe that the output is 1 if the inputs are different, but 0 if the inputs are the same. The logic circuit of XOR gate is
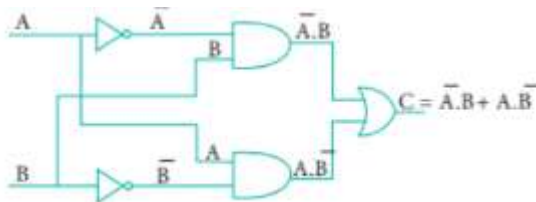
The output of the XOR gate is

The truth table for XOR gate is

Input		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

In boolean algebra. exclusive - OR operator $\oplus$ or "encircled plus". Hence $C = A \oplus B$

The logical symbol of XOR gate is

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. In simple words, the output is 1 if the input are the same, otherwise the output is 0. The logic circuit of XNOR gate is

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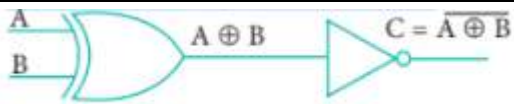
XOR
The output of the XNOR is NOT of

$$C = \overline{A \oplus B}$$

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

$$= AB + \overline{A}\ \overline{B}$$

In boolean algebra, $\odot$ or "included dot" stands for the XNOR. Therefore, $C = A \odot B$
The logical symbol is

The truth table for XNOR Gate is

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

3.COMPUTER ORGANIZATION 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 dist

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

VERY SHORT ANSWERS

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

a) Clock speed
b) Instruction set
c) 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 which interface 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?

EPROM retains its contents until it is exposed to ultraviolet light. The ultraviolet light clears its contents, making it possible to reprogram the memory.

PART-III

SHORTANSWERS:

1. Differentiate Computer Organization from Computer Architecture.
- Computer organization deals with the hardware components of a computer system.
- Computer architecture deals with the engineering considerations involved in designing a computer.

2. Classify the microprocessor based on the size of the data.
- 8-bit microprocessor
- 16-bit microprocessor
- 32-bit microprocessor
- 64-bit microprocessor

3. Write down the classifications of microprocessors based on the instruction set.
- RISC stands for Reduced Instruction Set Computers.
- Complex Instruction Set Computers (CISC)

4. Differentiate PROM and EPROM.
   PROM:
- Programmable read only memory is also a non-volatile memory on which data can be written only once.
- PROM is manufactured as a blank memory
- PROM programmer or a PROM burner is used to write data to a PROM chip.
- The process of programming a PROM is called burning the PROM.
   EPROM:
- Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM,
- The content can be erased using ultraviolet rays.
- An EPROM differs from a PROM, PROM can be written only once and cannot be erased.
- EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

5. Write down the interfaces and ports available in a computer.
- Serial Port
- Parallel Port
- USB Ports
- USB 3.0
- VGA Connector
- Audio Plugs
- PS/2 Port
- SCSI Port
- High Definition Multimedia Interface (HDMI)

6. Differentiate CD and DVD

CD	DVD
❖ A CD or CD-ROM is made from 1.2 millimetres thick, polycarbonate plastic material. A thin layer of aluminium or gold is applied to the surface. ❖ CD data is represented as tiny indentations known as "pits", The areas between pits are known as "lands". ❖ The capacity of an ordinary CDROM is 700MB.	❖ A DVD (Digital Versatile Disc or Digital Video Disc) is an optical disc. ❖ DVDs are often used to store movies at a better quality. DVDs are read with a laser. ❖ The disc can have one or two sides, and one or two layers of data per side; ❖ Capable of storing up to 4.7 GB of data.

7. How will you differentiate a flash memory and an EEPROM?
Flash memory devices:
❖ Flash memory is an electronic (solid-state) non-volatile computer storage medium that can be electrically erased and reprogrammed.
❖ Flash memories can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones.
❖ Flash memory offers fast access times.
❖ The time taken to read or write a character in memory is called access time.
❖ Examples for Flash memories are pen drives, memory cards etc.

EEPROM:
❖ Electrically Erasable Programmable Read Only Memory can be erased by exposing it to an electrical charge.
❖ EEPROM is non-volatile.
❖ EEPROM is slower in performance.

PART-IV

EXPLAIN IN DETAIL:

1. Explain the characteristics of a microprocessor.

A Microprocessor's performance depends on the following characteristics:

✓ Clock speed
✓ Instruction set
✓ Word size

a) 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).

b) Instruction Set:
❖ A command which is given to a computer to perform an operation on data is called as 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

c) 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

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

➢ The Central Processing Unit (CPU) has a Memory Data Register (MDR) and a Memory Address Register (MAR).

➢ The Memory Data Register (MDR) keeps the data which is transferred between the Memory and the CPU.

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

➢ The Arithmetic and Logic unit of CPU places the address of the memory to be fetched, into the Memory Address Register (MAR).

➢ A bus is a collection of wires used for communication between the internal components of a computer.

➢ 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.

➢ 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.

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

➢ A memory is just like a human brain. It is used to store data and instructions.

➢ Computer memory is the storage space in the computer, where data and instructions are stored.

➢ There are two types of accessing methods to access (read or write) the memory. They are

1. Sequential Access and
2. Random Access

SEQUENTIAL ACCESS:

The memory is accessed in an orderly manner from starting to end.

RANDOM ACCESS:

Any byte of memory can be accessed directly without navigating through previous bytes. Different memory devices are arranged according to the capacity, speed and cost.
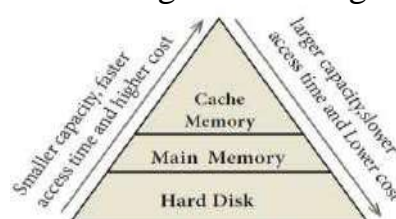

Figure 3.6 Memory Hierarchy

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4. Explain the types of 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.

➢ ROM stores critical programs such as the program that boots the computer.

➢ Once the data has been written onto a ROM chip, it cannot be modified or removed and can only be read.

➢ ROM retains its contents even when the computer is turned off.

➢ ROM is called as a non-volatile memory.

PROM:

❖ Programmable read only memory is also a non-volatile memory on which data can be written only once.

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

❖ PROM programmer or a PROM burner is used to write data to a PROM chip.

❖ The process of programming a PROM is called burning the PROM.

EPROM:

❖ Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM, but the content can be erased using ultra violet rays.

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

❖ EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

EEPROM:

❖ Electrically Erasable Programmable Read Only Memory can be erased by exposing it to an electrical charge.

❖ EEPROM is non-volatile.

❖ EEPROM is slower in performance.

4. THEORETICAL CONCEPTS OF OPERATING SYSTEM
PART-I

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

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

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

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

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

PART-II

VERY SHORT ANSWERS:

1. **List any two uses of Operating system?**
   To ensure that a computer can be used to extract what the user wants it do.
   ❖ Easy interaction between the users and computers.
   ❖ Starting computer operation automatically when power is turned on (Booting).
   ❖ Controlling Input and Output Devices
   ❖ Manage the utilization of main memory.
   ❖ Providing security to user programs.

2. **What is 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. Windows, Linux and UNIX are examples for multi-user Operating System.

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

4. **What are the security management features available in Operating System?**
   (1) File access level

(2) System level

(3) Network level

5. What is multi-processing?

❖ This is a one of the features of Operating System. Operating System 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.

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

❖ Single User Operating Systems

❖ Multi-user Operating Systems

❖ Multi-Processing Operating Systems

❖ Distributed Operating Systems

❖ Prominent Operating Systems

PART-III

SHORT ANSWER

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

Advantages	Disadvantages
It allows execution of multiple tasks or processes concurrently	Problem of Reliability
Quick Response	Questions of security and integrity of uses programs and data
Avoids duplication of software	Problem of data communication
Reduces CPU idle time	Various processes after a time is elapsed.

2. List the key features of Operating system

❖ User Interface

❖ File Management

❖ Memory Management

❖ Process Management

❖ Fault tolerance

❖ Security Management

3. Write a note on Multi processing

❖ Operating System 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

EXPLAIN IN DETAIL:

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

❖ The Distributed Operating System is used to access shared data and files that reside in any machine around the world using internet/ intranet. The user can handle the data from different locations.

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❖ The users can access as if it is available on their own computer.

The advantages of distributed Operating System are as follows:

❖ 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?**

❖ User interface is one of the significant features in Operating System. The only way that user can make interaction with a computer.

❖ The following points are considered when User Interface is designed for an application.

❖ The user interface should enable the user to retain this expertise for a longer time.

❖ The user interface should also satisfy the customer based on their needs.

❖ The user interface should save user's precious time. The ultimate aim any product is to satisfy the customer

❖ The User Interface must satisfy the customer.

❖ The user interface should reduce number of errors committed by the user

3. **Explain Process management technique in Operating system**

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

❖ **The Operating System is responsible for the following activities associated with the process management:**

❖ Operating system processes which is executed by system code.

❖ User processes which is executed by user code.

❖ 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**

   1. **FIFO (First In First Out) Scheduling:**
   ➢ This algorithm is based on queuing technique. The process that enters the queue first is executed first by the CPU, followed by the next and so on.
   ➢ The processes are executed in the order of the queue (row).

   2. **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.
   ➢ A = 6 kilo bytes 2) B = 9 kilo bytes. First the job "A" will be assigned and then job "B" gets its turn.

   3. **Round Robin Scheduling**
   ➢ The Round Robin (RR) scheduling algorithm is designed for time sharing systems.
   ➢ Jobs (processes) are assigned and processor time in a circular method.

- ➢ **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

4. Based On Priority

- ➢ The given job (process) is assigned based on a Priority.
- ➢ The job which has higher priority is processed first.
- ➢ 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.

5. WORKING WITH WINDOWS OPERATING SYSTEM
PART-I

CHOOSE THE BEST ANSWER:

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

a. Memory   b. Processor   c. 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 of the OS**

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-B

VERY SHORT ANSWERS:

1. What is known as Multi-Tasking?

❖ Multiple applications which can execute simultaneously in windows is known as "Multi-Tasking".

2. What are called standard icons?

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

❖ The standard icons available in all Windows OS are My Computer, Documents and Recycle Bin.

3. Differentiate Files and Folders.

Files	Folders
File is the collections of data/information. (Records).	Folder is a collection of files.
Create a File: Start All programs→ select application→ ok	**Create a folder:** Right click new Folder ok

4. Differentiate Save and Save As option.

➤ **"Save"** option save a new document in first time. (Ctrl+S)

➤ **"Save As"** option save an already saved the document with a new name and also create a copy of already saved document with a new name obviously.

5. How will you Rename a File?

To Rename a file,

1. Click File →Rename

2. Press F2 or click over the file or folder. A surrounding rectangle will appear around the name. Type in the new name

3. Click the right mouse button over the file or folder. Select Rename from the pop-up menu.

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4. To finalise the renaming operation, press Enter.

PART-III

SHORT ANSWERS:

1. What are the functions of windows operating system?

Some of the functions of Windows Operating System are:

❖ 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, screensavers of your monitor, etc.

2. Write a note on Recycle bin?

❖ Recycle bin is a folder which contains all deleted files and folders having an opportunity to recover from it.

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

❖ Title bar

❖ Menu bar

❖ Tool bar

❖ Scroll bars

❖ Status bar

❖ Borders

❖ Work Space (area) and

❖ Corners

4. Write a 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.

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:

Step 1: In the Desktop, right click → New → Folder.

Step 2: A Folder appears with the default name "New folder".

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?

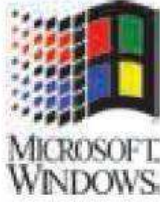| COPY	MOVE
To copy the file(s) or folder(s) in the new location, navigate to the target location then do one of the following:	To move a file or folder, first select the file or folder and then choose one of the following:
Click **Edit →Copy** or **Ctrl + C** or **right Click →Copy** from the pop-up menu.	Click on the **Edit →Cut** or **Ctrl + X** or right **click →cut** from the pop-up menu.

COPY	MOVE
Click **Edit** →**Paste** or **Ctrl + V.**	Click **Edit** →**Paste** or **Ctrl + V.**
Or **Right click** →**Paste** from the pop-up menu.	Or **Right click** →**Paste** from the pop-up menu.

<div align="center">

PART-IV

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EXPLAIN IN DETAIL:

1. **Explain the versions of Windows Operating System.**

Versions	Logo	Year	Specific features
Windows 1.x		1985	• Introduction of GUI in 16 - bit. processor • Mouse was introduced as an input device.
Windows 2.x		1987	• Supports to minimize or maximize windows. • Control panel feature was introduced with various system settings and customising options.
Windows 3.x		1992	• Introduced the concept of multitasking. • Supported 256 colours which brought a more modern, colourful look to the interface.
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 is 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?**
   Finding Files and Folders

   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.

   To find a file or folder:
   - Click the Start button, the search box appears at the bottom of the start menu.
   - 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.
   - 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.
   - There is another option called "**See more results**" which appears above the **search** box.
   - 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
   - Click **Computer Icon** from desktop or from **Start menu**.
   - The Computer disk drive screen will appear and at the top right corner of that screen, there is a **search** box option.
   - 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.

   Just click and open that file or the folder.

3. **Write a procedure to create shortcut in Windows OS?**
   - ❖ Shortcuts to your most often used folders and files may be created and placed on the Desktop to help automate your work.
   - ❖ 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 submenu.
   - ❖ 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.

6. Specification and Abstraction
SECTION – A
Choose the correct 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

SECTION-B
Very Short Answers

1. **Define an algorithm.**
   ❖ An algorithm is a step-by-step sequence of statements intented to solve a problem.
   ❖ As an algorithm is executed, a process evolves which solves the problem.
2. **Distinguish between an algorithm and a process.**

ALGORITHM	PROCESS
An algorithm is a step-by-step sequence of statements to solve a problem	An instruction describes an action
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.
      i. the goat cannot be left alone with the grass:
        if goat = grass then farmer = goat
      ii. the goat cannot be left alone with the wolf:
        if goat = wolf then farmer = goat
4. **Specify a function to find the minimum of two numbers.**
   Minimum(A,B)
   --inputs:A and B are integers (or) Real numbers
   --Outputs: A is minimum (A<B) (or) B is minimum (B<A)

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 $y^2=x$
   Yes, it violate the specification.

   Ex: x=9, y=?
   Square(x)
   Square(9)=3x3
   Square(9)=3^2
   3^2=9 → $Y^2=X$

SECTION-C

Short Answers

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?

❖ Let P be the required property of the inputs and Q the property of the desired outputs. Then the algorithm S is specified as
   1. algorithm_name (inputs)
   2. --inputs : P
   3. --outputs: Q

3. What is abstraction?

❖ A problem can involve a lot of details. Several of these details are unnecessary for solving the problem. Only a few details are essential.

❖ 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. The state at any point of execution is simply the values of the variables at that point.

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

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.

Format / Form:
   variable := value

Example:
   m := 2

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

ASSIGNMENT OPERATOR	EQUALITY OPERATOR
Assignment operator is used to assign the right hand side value into left hand side variable.	Equality operator is used to the values of both right hand side variable and left hand side variable and results in either true or false.
Example: A=5 B=10	**Example:** A==B (a=5, b=5) True A≠B (a=5, b=10) true

SECTION - D

Explain in detail

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.

Answer:

Hypotenuse (S1, S2)

--Inputs: S1 and S2 are Real numbers or Integers.

--Outputs: L is a Real number such that $L^2 = S1^2 + S2^2$

Explanation:

S1, S2 – Input Length of the Real number variables

L – Length of the Third side.

2. Suppose you want to solve the quadratic equation $ax^2 + bx + c = 0$ 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.

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

Answer:

quadratic_solve (a, b, c)

-- inputs: a, b are integers, a≠0

-- outputs: X is a real number, the quadration equation $ax^2 + bx + c = 0$ is satisfied by exactly two values fx, namely

$$X_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

and

$$X_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

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.

Answer:

Exchange (a, b)

--Inputs: a, b are integers, a≠0, b≠0

--Outputs: a, b are Integers,

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

7. Composition and Decomposition
SECTION – A

Choose the correct 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   (c) u, v = 10 ,5   **(b) u, v = 5 ,10**   (d) u, v = 10 ,10

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

   1 --i, j = 0, 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
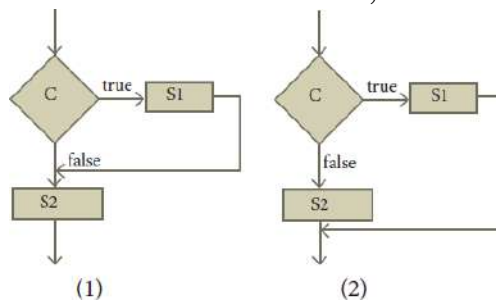
    (a) (1) only   (b) (2) only (c) both (1) and (2)   (d) neither (1) nor (2)

6. How many times the loop is iterated?

       i := 0
       while i ≠ 5
       i := i + 1

       (a) 4   **(b) 5**   (c) 6   (d) 0

SECTION-B

Very Short Answers

1. Distinguish between a condition and a statement.

CONDITION	STATEMENT
Condition is the Checking process of either True/ False	Processing the condition
A condition is contained in a diamond shaped box with two outgoing arrows, labelled true and false.	A statement is contained in a rectangular box with a single outgoing arrow, which points to the box to be executed next.
EX: a>b	EX: Print a (a-is a Biggest value)

2. Draw a flowchart for conditional statement.
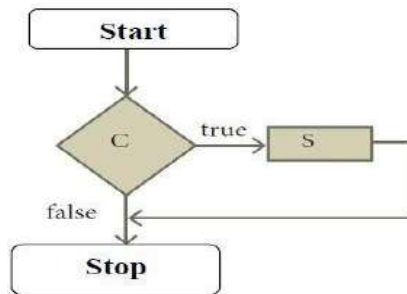
3. Both conditional statement and iterative statement have a condition and a statement. How do they differ?

❖ Conditional statement is executed only if the condition is true. Otherwise nothing is done.

❖ Iterative statement repeatedly evaluates a condition and executes a statement as long as the condition is true.

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

ALGORITHM	PROGRAM
An algorithm is a self-contained step-by-step set of operations to be performed to solve specific problems.	A Computer program is a sequence of instructions that complete the rules of a specific programming language, written to perform a specified task with a computer.
Method / Procedure of a program	Computer Coding / Program

5. Why is function an abstraction?

❖ The parts of an algorithm are known as functions. A function is like a sub algorithm.

❖ It takes an input, and produces an output, satisfying a desired 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.

SECTION-C

Short Answers

1. For the given two flowcharts write the pseudo code.
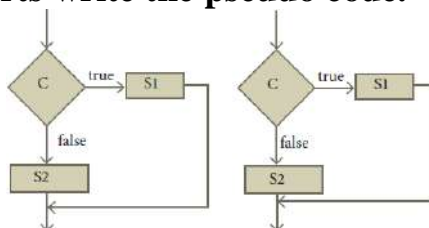
1. Enter A, B
2. Initialize Q = 0, r = A
3. if r ≥ B, then do Q = Q+1; r = r – B else r, q
4.Exit

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

2. **What is case analysis?**
❖ Alternative statement analyses the problem into two cases. Case analysis statement generalizes it to multiple cases.
❖ Case analysis splits the problem into an exhaustive set of disjoint cases.

3. **Draw a flowchart for -3case analysis using alternative statements.**
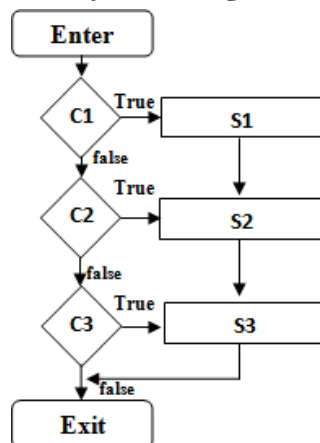
4. **Define a function to double a number in two different ways: (1) n + n, (2) 2 x n**
   (1) n + n
     - - Input: n is a real number or an integer, n>0
     - - Output: y is a real number or an integer such that $y = n + n$
   (2) 2 x n
     - - Input: n is a real number or an integer, n>0
     - - Output: y is a real number or an integer such that $y = 2 \times n$

SECTION - D

Explain in detail

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.
ANSWER:
   Exchange (A, B)

-- inputs : A, B are real number or an integers, A≠0, B≠0
-- outputs : t is an integer such that t :=A; A:=B; B:=t.

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.
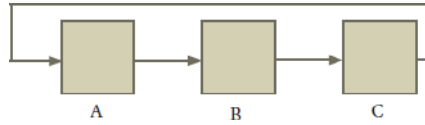
Solution:

Circulate (A, B, C)

--Inputs : A, B, C are real numbers or an integers, A≠0, B≠0, C≠0

--Outputs : t1:=B; t2:=C such that B:=A; C:=t1; A:=t2;

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.

Solution:

		E F T
1.	A := 8, B:=0, C:=0	1. 8, 0, 0
2.	E, F, T := A, B, C	2. 3, 5, 0
3.	F := E − 3	3. 3, 2, 3
4.	T := F − 3	4. $\frac{3+3}{6\ 2\ 0}$
5.	E := E + T	E F T
6.	T := F	6, 2, 0
	F := F − 2	1, 5, 2
7.	F := E − 1	1, 4, 3
		4, 4, 0
8.	F := F − 1	
	T := T + 1	
9.	E := E + T	
	T := T − 3	

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

Solution:

Factorial (4)

i = 1, f = 1;

= f = 1 x 1

= f = 1 x 2

= f = 2 x 3

= f = 6 x 4

= f = 24

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SECTION – A

Choose the correct 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 a^{10}?
   (a) 11   (b) 10   **(c) 9**   (d) 8

SECTION-B

Very Short Answers

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.

❖ An expression of the variables has the same value before and after an assignment, it is an invariant of the assignment.

2. Define a loop invariant.

❖ An invariant of the loop body is known as a loop invariant.

❖ When the loop ends, the loop invariant has the same value.

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

❖ Yes, it affects. When a loop ends, the loop invariant is true. In addition, the termination condition is also true.

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

LOOP INVARIANT	LOOP CONDITION
An invariant for the loop body is known as a loop invariant.	A loop condition that produces the result based particular condition.

A loop invariant is a condition that is necessarily true immediately before and immediately after each iteration of a loop.	A loop invariant is some condition that holds for every iteration of 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 $1*2*3*4= 24$.
Factorial (4)
$i = 1, f = 1;$
$= f = 1 \times 1= 1$
$= f = 1 \times 2= 2$
$= f = 2 \times 3= 6$
$= f = 6 \times 4= 24$

SECTION-C

Short Answers

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.)

Solution:

This Tumbler problem Result (Output) is needs to be turn all tumblers UP.

[u – no of tumblers]

1. Two tumblers can be both upside up. After turning u – increments by 2.

2. Two tumblers are both upside down. After turning u – decrements by 2.

3. One is upside down and another is proper.

U – is not changed.

So, after every step.

U – is either incremented by 2 or decremented 2 or kept the same.

We can ignore the condition of u – not being changed.

Now, u := u + 2 (or) u := u – 2

The invariant in this is that parity of u – is not changing. i.e; if u – is even at the beginning, it's not changed at all and similarly if u – is odd.

That invariant is the initial state that needs to be defined. The final requirement is that u- needs to become zero. This is possible only when the parity of u-is zero, u is even.

The final solution is if the number of tumblers that are upside down is even it is possible to get to a state by repeating the process for all the tumblers that are upside up.

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?

Solution:

Knockout tournament

1234 initial number of players each round a player is laid off thus

n number of remaining players.

r – total number of rounds

k – number of rounds held assuming n is even

n, r := n-k, r+k

n + r is invariant

winners is decided when n = 1

initially n + r =1234, therefore r – 12333!(makes sense = 1233 rounds will eliminate 1233 players).

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.)

Solution:

❖ If it is 1000 heads:

❖ You can now cut off 981 heads (multiple of 3) then cut the last 19 and the dragon will die.

❖ The 13 heads won't come back after the dragon is killed. Unless it's a magic dragon.

SECTION - D

Explain in detail

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 re-peatedly. 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 ($|8 - b) - b|$).

Solution:
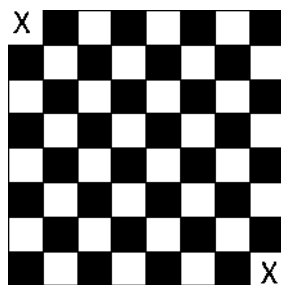
2. Power can also be defined recursively as

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

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

Solution:

Power (a, n)

Input n - is am integer, n $\geq$ 0

-- Output : an

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if n = 0 – base case
1
else
if(n%2! = 0) – recursion step in case of odd
a x power(a, n – 1)
else
a x power(a, n/2) --- recursion step in case of even.

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 tocover the this board with triominoes without overlap.**

Solution:

$2^{2n} – 1$

To identify the 2-by-2 square containing the missing square; and we place our first L-shaped piece to finish covering that 2-by-2 square:

O O O O O O O O
O O O O O O O O
O O O O O O a a
O O O O O O X a
O O O O O O O O
O O O O O O O O
O O O O O O O O
O O O O O O O O

9. Introduction to C++

SECTION – A

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 in C++?
   (a) >>   (b) <<   (c) <>   (d) ^^
6. Which of the following statements is not true?
   (a) Keywords are the reserved words which 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 consist 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

SECTION-B

Very Short Answers

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 "Lexical unit."
   ➤ C++ has the following tokens:
      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.
   ➤ Keywords are Essential elements to construct C++ programs.
   ➤ C++ is a case sensitive programming language so, all the keywords must be in lowercase.
   ➤ Reserved words or keywords cannot be used as an identifier name.
3. **The following constants are of which type?**
   (i) 39   -   Decimal (integer)
   (ii) 032   -   Octal (integer)
   (iii) 0XCAFE   -   Hexadecimal (integer)
   (iv) 04.14   -   Real constant (floating point)
4. **Write the following real constants into the exponent form:**
   (i) 23.197   - 0.23197×10^2 0.23197E2

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(ii) 7.214   - 0.7214×10^1 0.7214E01
(iii) 0.00005   - 0.5×10^{-4} 0.5E-04
(iv) 0.319   - 0.0319×10^1 0.0319E01

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

n++ = 11

- -n=9

6. **Match the following**

A	B
(a) Modulus	(1) Tokens
(b) Separators	(2) Remainder of a division
(c) Stream extraction	(3) Punctuators
(d) Lexical Units	(4) get from

SECTION-C

Short Answers

1. **Describe the differences between keywords and identifiers?**

KEYWORDS	IDENTIFIERS
Keywords are the reserved words which convey specific meaning to the C++ compiler.	Identifiers are the user-defined names given to different parts of the C++ program
Keywords are the essential elements to construct C++ programs.	These are the fundamental building blocks of a program.
EX: int , void , break , do , if etc..	**EX:** variable_name, function_name, array_name, classe_name etc..

2. **Is C++ case sensitive? What is meant by the term "case sensitive"?**
   - ➢ C++ is a case sensitive programming language.
   - ➢ C++ is case sensitive as it treats upper and lower-case characters differently.
   - ➢ Capital Letters ≠ Small Letters

3. **Differentiate "=" and "==".**
   - ➢ = - Equal (Assignment Operator) Assign a value of an Variable.
   - ➢ = = - Equal to (Equality Operator) To Indicate Two Operands are Equal.

4. **What is the use of a header file?**
   - ➢ 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.
   - ➢ iostream header file contains the definition of its member objects cin and cout.

5. **Why is main function special?**
   - ➢ C++ program is a collection of functions. 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.
     i.e The main function always special.

SECTION - D

Explain in detail

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

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➢ **Binary Operators -** Require two operands

C++ Binary Operators are classified as:

1. Arithmetic Operators
2. Relational Operators
3. Logical Operators
4. Assignment Operators
5. Conditional Operator

1.   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)

2.   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.

➢ C++ provides six relational operators. They are,

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

3.   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.

➢ C++ provides three logical operators.

Operator	Operation	Description
&&	AND	The logical AND combines two different relational expressions in to one. It returns 1 (True), if both expression are true, otherwise it returns 0 (false).
||	OR	The logical OR combines two different relational expressions in to one. It returns 1 (True), if either one of the expression is true. It returns 0 (false), if both the expressions are false.
!	NOT	NOT works on a single expression / operand. It simply negates or inverts the truth value. i.e., if an operand / expression is 1 (true) then this operator returns 0 (false) and vice versa

AND, OR both are binary operators where as NOT is an unary operator

4. Assignment Operators:

➢ 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. This operator copies the value at the right side of the operator to the left side variable. It is also a binary operator.

Operator	Name of Operator
+=	Addition Assignment
-=	Subtraction Assignment
*=	Multiplication Assignment
/=	Division Assignment
%=	Modulus Assignment

5. Conditional Operator

➢ In C++, there is only one conditional operator.
➢ ?: is a conditional Operator which is also known as Ternary Operator. This operator is used as an alternate to if … else control statement.

2. What are the types of Errors?

Type of Error	Description
Syntax Error	• Syntax is a set of grammatical rules to construct a program. Every programming language has unique rules for constructing the sourcecode. • Syntax errors occur when grammatical rules of C++ are violated. • Example: if you type as follows, C++ will throw an error. **cout << "Welcome to Programming in C++"** • 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 occurs because of some illegal operation that takes place. • For example, if a program tries to open a file which does not exist, it results in a run-time error

PART-II Data Types, Variables and Expressions SECTION – A

Choose the correct answer

1. How many categories of data types are 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 is allocated 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 is 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**

SECTION-B

Very Short Answers

1. **Write a short note on const keyword with an example.**
   ➢ Literals are data items whose values do not change during the execution of a program.
   ➢ const is the keyword used to declare a constant.
   Example:
   int num = 100; (The value of num can be changed during the execution.)
   const int num = 100; (The value can never be changed during the execution.)
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.
   ➢ If a variable is declared as char, C++ allows storing either a character or an integer value.

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. Above two characters (ch=67, ch='C') are equal.

6. **What is the difference between 56L and 56?**
- 56 - is a Integer Number - 2 Bytes
- 56L - is a Long Integer Number - 4 Bytes

7. **Determine which of the following are valid constant? And specify their type.**
   (i) 0.5   -   Valid Floating Constant
   (ii) 'Name' -   Invalid String Constant (Enclosed within Double quotes)
   (iii) '\t'   -   Valid Horizontal tab, But it is not valid constant
   (iv) 27,822 -   Invalid Decimal Constant (Commas is not allowed)

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 to do the above.**
- Two double type variable – double x,y and one integer variable – int z
  Adding x and y and assign to an integer variable z(result must be integer)

Eg: x=2.5, y=1.2 then result z=3(it must be integer)

```
#include<iostream.h>
#include<conio.h>
void main()
{
clrscr();
int z;
double x,y;
cout<<"Give input: x and y:";
cin>>x>>y;
z=x+y;
cout<<"Result z = " <<z;
getch();
}
```

Output:
Give input: x and y:
2.5
1.2
Result z = 3

9. **What will be the result of following if num=6 initially.**
   (a) cout << num;   → 6
   (b) cout << (num==5);   → 0

10. **Which of the following two statements are valid? Why? Also write their result.**
   (i) int a; a = 3,014; (ii) int a; a=(3,014);
- Above the two statements is Invalid.
- Special Symbols are not allowed in the integer values (Commas, Open and Close Brackets)

SECTION-C

Short Answers

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.,

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 remind-er of a division)	10 % 3 = 1(Remainder of the division)

   The above mentioned arithmetic operators are binary operators which requires minimum of two operands.

   Increment and Decrement Operators:

   ++ (Plus, Plus) Increment operator

   -- (Minus, Minus) Decrement operator

   An increment or decrement operator acts upon a single operand and returns a new value. Thus, these operators are unary operators. The increment operator adds 1 to its operand and the decrement operator subtracts 1 from its operand. For example,

   • x++ or ++ x is the same as x = x+1;

   It adds 1 to the present value of x

   • x -- or -- x is the same as to x = x–1;

   It subtracts 1 from the present value of x

   The ++ or -- operators can be placed either as prefix (before) or as postfix (after) to a variable. With the prefix version, C++ performs the increment / decrement before using the operand.

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

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

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;

   $$n = 5 + (4 / 5)$$
   $$n = 5 + 0.8$$
   $$n = 5.8$$

   (ii) z = m * x + y;

   $$z = (2.5 * 5) + 4$$

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z =12.5 + 4   z = 16 (z – is integer)
z = 16.5

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

                z = ((5++) * 2.5) + 5
                z = (5 * 2.5) + 5
                z = 12.5 + 5
                z = 17.5
                z=17 (z – is integer)

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 enclose 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 branch 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 (inti=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 exit 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?**
   ➢ The "null or empty statement" is a statement containing only a semicolon (;).
   ➢ 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?**
   ➢ 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. This statement is also called decision statement or selection
      statement
   ➢ **Types:** If, if else, Nest if, if -else-if ladder, The ?: Alternative to if- else, Switch
      statement

   3. **Correct the following code segment:**
      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 (ii) 2003 (iii) 2010?

   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;
   ```
   Output:
   ```
   2
   4
   6
   8
   10
   ```

6. **Write a for loop that displays the number from 21 to 30.**
   ```
   #include <iostream>
   using namespace std;
   int main()
   {
           clrscr();
           int i;
           for (i=21; i<=30 ; i++)
           cout<< "\n" <<i;
           getch();
   }
   ```

7. **Write a while loop that displays numbers 2, 4, 6, 8. 20.**
   ```
   #include <iostream>
   using namespace std;
   int main()
   {
           clrscr();
           inti=2;
   ```

```
            while (i<=20)
            {
                    i=i+2;
                    cout<< "\n" <<i;
            }
            getch();
    }
```

8. Compare an if and a? : Operator.

if	?:
if the condition is true then a true-block executed, otherwise the true-block is skipped	The conditional operator (or) Ternary operator is an alternative for 'if else statement'.

Syntax:
    if (expression)
      true-block;
    statement-x;
	Syntax:
	expression 1? expression 2 : expression 3

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;
                      Answer:
                        x >= 10 ? a = m + 5 : a = m

2. Rewrite the following code so that it is functional:
v = 5;
do;
 {
total += v;
cout<< total;
while v <= 10
                Answer:

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

3. Write a C++ program to print multiplication table of a given number.
```
        #include<iostream>
        using namespace std;
        int main()
```

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```
        {
        intnum;
        cout<<"Enter Number To Find Multiplication table ";
        cin>>num;
for(int a=1;a<=10;a++)
                {
                cout<<num<<" * "<<a<<" = "<<num*a<<endl;
             }
        return 0;
        }
```

Output:


```
Enter Number To Find Its Multiplication table  3
3 * 1 = 3
3 * 2 = 6
3 * 3 = 9
3 * 4 = 12
3 * 5 = 15
3 * 6 = 18
3 * 7 = 21
3 * 8 = 24
3 * 9 = 27
3 * 10 = 30
Press any key to continue
```

4. **Write the syntax and purpose of switch statement.**
   Syntax of switch

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

Purpose of switch statement:
   ➢ The switch statement is a multi-way branch statement.
   ➢ A switch statement can only work for quality of comparisons.
   ➢ No two case labels in the same switch can have identical values.

5. **Write a short program to print following series:**
   (a) 1 4 7 10. 40

```
#include<iostream>
using namespace std;
int main()
{
        clrscr();
        inti,a=-1,b;
        for(i=1;i<=40;i+=3)
        {
                Cout<<i;
```

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```
            }
        getch();
    }
```

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.
   - In a program, statements may be executed sequentially, selectively or iteratively. Every programming language provides statements to support sequence, selection (branching) and iteration.
   - If the Statements are executed sequentially, the flow is called as sequential flow.
   - In some situations, if the statements alter the flow of execution like branching, iteration, jumping and function calls, this flow is called as control flow.
   - 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. These statements are called as sequential flow statements. They are always end with a semicolon (;).
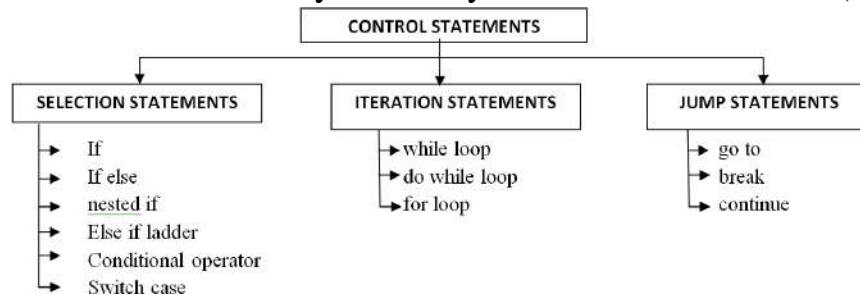
1) The selection statement means the statement (s) are executed depends upon a condition. If a condition is true, a true block (a set of statements) is executed otherwise a false block is executed. This statement is also called **decision statement** or **selection statement.**

2) Iteration Statement (looping) is use to execute a set of statements repeatedly until a condition is satisfied.
   - If a condition evaluates to true, the set of statements (true block) is executed again and again.
   - This is also known as **looping statement** or iteration statement.

3) Jump Statement are used to interrupt the normal flow of programs. Types of jump statements are
   - goto
   - break
   - continue

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

   In an entry controlled loop, the test expression is evaluated before the entering into a loop. The body of the loop is executed as long as the test condition is true or if it is false, the body of the loop will not get executed even once.

Examples of Entry Controlled Loop:
   - for loop
   - while loop

for loop:

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The for-loop is the easiest looping statement which allows code to be executed repeatedly.

The general syntax is:

```
for (initialization(s); test-expression; update expression(s))
{
        Statement 1;
        Statement 2;
        ………….
}
Statement-x;
```

Example Program:

```cpp
#include  <iostream>
using namespace std;
int main ()
{
inti;
for(i = 0; i< 5; i ++ )
cout<< "value of i : " <<i<<endl;
return 0;
}
```

Output

```
value of i : 0
value of i : 1
value of i : 2
value of i : 3
value of i : 4
```

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

To find the LCM of two numbers

```cpp
#include  <iostream>
using namespace std;
int main()
{
int n1, n2, max;
cout<< "Enter two numbers: ";
cin>> n1 >> n2;
max = (n1 > n2) ? n1 : n2;
do
{
if (max % n1 == 0 && max % n2 == 0)
{
cout<< "LCM = " << max;
break;
}
else
++max;
} while (true);
return 0;
```

```
}
```
Output:

Enter two numbers:12

18

LCM = 36

To find the GCD of two numbers

```cpp
#include <iostream>
using namespace std;
int main()
{
int n1, n2;
cout<< "Enter two numbers: ";
cin>> n1 >> n2;
while(n1 != n2)
{
if(n1 > n2)
n1 -= n2;
else
n2 -= n1;
}
cout<< "GCD = " << n1;
return 0;
}
```

Output:

Enter two numbers: 78

52

GCD = 26

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

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

(b) $x + \dfrac{x^2}{2} + \dfrac{x^3}{3} + \ldots + \dfrac{x^n}{n}$

```cpp
#include <iostream>
using namespace std;
int main()
{
Int x,p=6,i,j;
double fact=1.0,ans=0;
cout<<"Enter the value of x:";
cin>>x;
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;
}
```
OUTPUT:
Enter the value of x: 3
The sum of the series is: -4.875

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

```
#include <iostream>
using namespace std;
int main()
{
clrscr();
inti,n;
floatx,sum=0;
cout<<"x+x^2/2+x^3/3+.....+x^n/n";
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();
}
```
OUTPUT:
x+x^2/2+x^3/3+....+x^n/n
Enter value of x and n: 3 4
Sum=36.75

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();
longi,n,x,sum=1;
cout<<"1+x+x^2+……+x^n";
cout<<"\n Enter the value of x and n:";
cin>>x>>n;
for(i=1;i<=n;++i)
sum+=pow(x,i);
cout<<"\n Sum="<<sum;
getch();
}
```

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Output:

```
1+x+x^2+......+x^n

Enter the value of x and n:5
2

Sum=31
```

11. Functions
Part – 1

Choose the best 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 subprogram 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.
   ➢ **Ex:**

   > name= "vijay"
   >> strlen(name); [**length of the name = 5**]
3. **What are importances of void data type?**
   Void type has two important purposes:
   ➢ 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
   1. The variables used in the function definition as parameters are known as **formal parameters.**
   2. The constants, variables or expressions used in the function call are known as **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 { }.
   ➢ A local variable cannot be accessed from outside the block of its declaration.

Part – III

Answer to all the questions   **(3 Marks)**

1. **What is Built-in functions?**
   ➢ The functions which are available by default known as **"Built-in"** functions

> Header files provide function prototype and definitions for library functions.
> Header file can be identified by their file extension **.h.**
> A single header file may contain multiple built-in functions.
> Example: **stdio.h --** it contains pre-defined **"standard input/output"** functions.

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

isuppr()	toupper()
> This function is used to check the given character is uppercase.	> This function is used to convert the given character into its uppercase.
> This function will return 1 if true otherwise 0.	> This function will return the upper case equivalent of the given character
> Ex: int n=isupper('A');	> Ex: char c=toupper('k'); →K

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.
> 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?
Example: *long fact (int, double)*
The prototype above example provides the following information to the compiler:
> 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 a default argument? Give example.
> In C++, one can assign default values to the formal parameters of a function prototype. 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 :defaultvalue(x,y);
             defaultvalue(200,150);
             defaultvalue(150);

Part –IV

Answer to all the questions   **(5 Marks)**

1. **Explain Call by value method with suitable example.**
   - Call by value 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.

Example program:
```
#include<iostream>
using namespace std;
void display(int x)
{
int a=x*x;
cout<<"\n\nThe Value inside display function (a * a):"<<a;
}
int main()
{
int a;
cout<<"\nExample : 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:
> Enter the Value for A: 5
> The Value inside display function (a * a): 25
> The Value inside main function 5

2. **What is Recursion? Write a program to find factorial of the given number using recursion.**
   - A function that calls itself is known as recursive function. And, this technique is known as recursion.

   Example program: Factorial of a Number Using Recursion
```
#include <iostream>
using namespace std;
int factorial(int); // Function prototype //
int main()
        {int no;
        cout<<"\nEnter a number to find its factorial: ";
        cin>> no;
        cout<< "\nFactorial of Number " << no <<" = " << factorial(no);
        return 0;
```

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```
        }
int factorial(int m)
        {
                if (m > 1)
                {return m*factorial(m-1);}
                else
                {return 1;}
        }
```

Output:

Enter a number to find its factorial: 5

Factorial of Number 5 = 120

3. **What are the different forms of function return? Explain with example.**
   - ➢ Returning from the function is done by using the **return** statement.
   - ➢ The **return** statement stops execution and returns to the calling function. When a **return** statement is executed, the function is terminated immediately at that point.

Different forms of function return:
   - ➢ The return statement
   - ➢ The Returning values

1. **The return statement**
   - ➢ The **return** statement is used to return from a function. It is categorized as a jump statement because it terminates the execution of the function and transfer the control to the called statement.
   - ➢ A **return** may or may not have a value associated with it. If return has a value associated with it, that value becomes the return value for the calling statement.
   - ➢ Even for void function return statement without parameter can be used to terminate the function.

Syntax:

   return expression / variable;

Example:return(a+b); return(a);

                   return;

2. **The Returning values:**
   - ➢ The functions that return no value is declared as void. The data type of a function is treated as **int**, if no data type is explicitly mentioned.

Example:

   int add (int, int);
   add (int, int);

   - ➢ In both prototypes, the return value is int, because by default the return value of a function in C++ is of type **int**. Look at the following examples:
   - ➢ **Example Program: Returning Non-integer values**

     ```
     #include<iostream>
     #include<string.h>
     using namespace std;
     char *display()
     ```

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```
{     return ("chennai");   }

int main()
{
    char s[50];
   strcpy(s,display());
    cout<<"\nExample:Function with Non Integer Return"<<s;
     return(0);
}
```

Output:

Example: Function with Non Integer Return Chennai

4. Explain scope of variable with example.

➢ Scope refers to the accessibility of a variable. There are four types of scopes in C++.

            1. Local scope
            2. Function scope
            3. File scope
            4. Class scope

Introduction

➢ A scope is a region or life of the variable and broadly speaking there are three places, where variables can be declared,

- Inside a block which is called local variables.
- Inside a function is called function variables.
- Outside of all functions which is called global variables.
- Inside a class is called class variable or data members.

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 is created upon entry into its block and destroyed upon exit.

➢ A local variable cannot be accessed from outside the block of its declaration.

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.

Example program:

```
#include<iostream>
Using namespace std;
intfile_var=20;
void add(int x)
{int m;
```

```
                    m=x+30+file_var;
                    count<<"\n The Sum ="<<m;
            }
            int main()
            {
                    int a;
                    a=10;
                    if(a>b)
                    {
                            int t;
                            t=a+20;
                    }
            cout<<t;
            add(a);
            count<<m;
            cout<<"\n The File Variable="<<file_var;
            return(0);
            }
```

ERROR
In function 'intmain()':
[Error] 't' was not declared in this scope
 The compiler prompts an error message: The variable **t** is not accessible. Because the life
time of a local variable is the life time of a block in its state of execution.
[Error] 'm' was not declared in this scope
 The variable **m** is not accessible. Because the life time of the function scope variable is the
life time of a block in its state of execution.
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.

class student	The class student contains
{	mark1, mark2 and total are
private :	data variables. Its scope is
int mark1, mark2, total;	within the class student
};	only.

5. **Write a program to accept any integer number and reverse it.**
   ```
   #include <iostream>
   using namespace std;
   int main()
   {
           int n, reversedNumber = 0, remainder;
           cout<< "Enter an integer: ";
           cin>> n;
           while(n != 0)
           {
                   remainder = n%10;
   ```

```
            reversedNumber = reversedNumber*10 + remainder;
            n /= 10;
        }
        cout<< "Reversed Number : " <<reversedNumber;
        return 0;
    }
```

Output:

```
Enter an integer: 12345
Reversed number: 54321
```

12. Arrays and Structures
PART – I

Choose the correct answer

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 {intnum;}   (b) struct sum {intnum;}
   (c) struct sum int sum;   **(d)struct sum {intnum;};**

9. A structure declaration is given below.

   struct employee
   {
         intempno;
         charename[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.
> ➢ Two-dimensional (2D) arrays are collection of similar elements where the elements are stored in certain number of rows and columns.
> ➢ An example **m × n** matrix where **m** denotes the number of rows and **n** denotes the number of columns.
> ➢ **Syntax:**
>   <datatype><array_name>[row-size][col-size];

4. Define structure. What is its use?
> ➢ Structure is a user-defined which has the combination of data items with different data types.
> **Use:**
> ➢ This allows to group of variables of mixed data types together into a single unit.

5. What is the error in the following structure definition.
struct employee{ inteno;charename[20];char dept;}
> **Employee e1,e2;**
>
>   struct employee
>   {
>   Int eno;
>   Char name[20];
>   char dept;
>   }
>   employee 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:
  1. One-dimensional arrays
  2. Two-dimensional arrays
  3. 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 of 2D Array:**
>   char Name[6][10];
> ➢ **Initialization:**
> char Name[6][10] = {"Mr. Bean", "Mr.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 exam no,lang,eng,phy,che,mat,csc,total;char name[15];};
int main()
{
student s[20];
for(inti=0;i<20;i++)
{
…………………….. //accept student details
}
for(inti=0;i<20;i++)
{
…………………….. //check for name starts with letter "S"
……………………. // display the detail of the checked name
}
return 0;
}
```

ANSWER:

```
struct student {int exam no,lang,eng,phy,che,mat,csc,total;char name[15];};
int main()
{
      student s[20];
      for(inti=0;i<20;i++)
      {
            Cout<<"enter the students name one by one:";
            Cin>>name[i];
      }
      for(inti=0;i<20;i++)
      {
            if(name[0]=='s')
            cout<<name[i];
      }
return 0;
}
```

4. How to access members of a structure?Give example.
➢ Data members are accessed by dot(.) operator.
Syntax:objectname.datamember;
➢ 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

5. What is called anonymous structure .Give an example
➢ A structure without a name/tag is called anonymous structure.
➢ Example:

```
            struct
            {
                  longrollno;
                  int age;
```

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```
                    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.**

```cpp
#include<iostream>
using namespace std;
int main()
{
        clrscr();
        int arr1[3][3], arr2[3][3], arr3[3][3], sub, i, j;
        cout<<"Enter 3*3 Array 1 Elements:";
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        cin>>arr1[i][j];
                }
        }
        cout<<"Enter 3*3 Array 2 Elements:";
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        cin>>arr2[i][j];
                }
        }

        count<<"Sudstractingarray(array1-array2)….\n";
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        arr3[i][j]=arr1[i][j]-arr2[i][j];
                }
        }
        cout<<"Result of Array1-Array2 is:\n";
        for(i=0;i<3;i++)
        {
                for(j=0;j<3;j++)
                {
                        cout<<arr3[i][j]<<"";
                }
                cout<<"\n";
```

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```
            }
        getch();
        }
```

Output:

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

       struct Distance{
       int feet;
       float inch;
       }d1 , d2, sum;

➢ In C++, arrays can be passed to a function as an argument. To pass an array to a function in C++, the function needs the array name as an argument.

➢ Passing a two-dimensional array to a function

EXAMPLE: C++ program to display values from two dimensional arrays

```
#include <iostream>
using namespace std;
void display (int n[3][2]);
int main()
{
intnum[3][2] = { {3, 4}, {9, 5}, {7, 1} };
display(num);
return 0;
}
void display(int n[3][2])
{
cout<< "\n Displaying Values" <<endl;
for (inti=0; i<3; i++)
{
for (int j=0; j<2; j++)
{
cout<< n[i][j] << " ";
}
cout<<endl<<endl;
}
}
```

Output:
Displaying Values
3 4

9 5

7 1

3. **Write the output of the following c++ program**
#include<iostream>
#include<stdio>
#include <string>
#include<conio>
using namespace std;
struct books {

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```cpp
char name[20], author[20];
} a[50];
int main()
{
clrscr();
cout<< "Details of Book No " << 1 << "\n";
cout<< " ----------------------\n";
cout<< "Book Name :"<<strcpy(a[0].name,"Programming ")<<endl;
cout<< "Book Author :"<<strcpy(a[0].author,"Dromy")<<endl;
cout<< "\nDetails of Book No " << 2 << "\n";
cout<< " ----------------------\n";
cout<< "Book Name :"<<strcpy(a[1].name,"C++programming" )<<endl;
cout<< "Book Author :"<<strcpy(a[1].author,"BjarneStroustrup ")<<endl;
cout<<"\n\n";
cout<< "=================================================\n";
cout<< " S.No\t| Book Name\t|author\n";
cout<< "=================================================";
for (inti = 0; i< 2; i++) {
cout<< "\n " <<i + 1 << "\t|" << a[i].name << "\t| " << a[i].author;
}
cout<< "\n=================================================";
return 0;
}
```


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

```cpp
#include <iostream>
#include <string>
using namespace std;
struct student
{
introll_no;
char name[10];
longphone_number;
};
int main(){
student p1 = {1,"Brown",123443};
student p2, p3;
p2.roll_no = 2;
```

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```
strcpy(p2.name ,"Sam");
p2.phone_number = 1234567822;
p3.roll_no = 3;
strcpy(p3.name,"Addy");
p3.phone_number = 1234567844;
cout<< "First Student" <<endl;
cout<< "roll no : " << p1.roll_no <<endl;
cout<< "name : " << p1.name <<endl;
cout<< "phone no : " << p1.phone_number <<endl;
cout<< "Second Student" <<endl;
cout<< "roll no : " << p2.roll_no <<endl;
cout<< "name : " << p2.name <<endl;
cout<< "phone no : " << p2.phone_number <<endl;
cout<< "Third Student" <<endl;
cout<< "roll no : " << p3.roll_no <<endl;
cout<< "name : " << p3.name <<endl;
cout<< "phone no : " << p3.phone_number <<endl;
return 0;
}
```


5. Debug the error in the following 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
```

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```
<<setw(10) <<people.age;
}
}
LoadArray(PersonRecpeop)
{
for (inti = 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;}
```
ANSWER:
```
#include <iostream.h>
structPersonRec
{
    char    lastName[10];
    char    firstName[10];
    int age;
} people;
voidLoadArray();
void main()
{
    clrscr();
    PersonRec people;
    inti;
    for (i = 0; i< 10; i++)
    {
        cout<<people.firstName<< " "
        <<people.lastName<<endl
        <<people.age;
    }
}
LoadArray(PersonRec people)
{
    for (inti = 0; i< 10; i++)
    {
        cout<< "Enter first name: ";
        cin>>people.firstName;
        cout<< "Enter last name: ";
        cin>>people.lastName;
        cout<< "Enter age: ";
        cin>>people.age;
    }getch();
    return 0;}
```

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13. Introduction to Object Oriented Programming Techniques

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. Insulation 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

PART II

Answer to all the questions:　　　　　　　　　　　　　　　　**(2 Marks)**

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

MODULAR PROGRAMMING	MODULAR PROGRAMMING
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.
Features: ✓ Programs are divided into individual modules. ✓ Each modules are independent of each other and have their own local data.	**Features:** ✓ Programs are organized in the form of subroutines or sub programs. ✓ All data items are global.
Example: Pascal and C	**Example:** FORTRAN and COBOL.

2. Differentiate classes and objects.

classes	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.
Objects are share common properties and relationship.	An identifiable entity with some Characteristics and behavior.

3. What is polymorphism?
  - Polymorphism is the ability of a message or function to be displayed in more than one form.
  - **Example:**

Draw_square()	Draw_circle()	Draw_rectangle()

4. How is encapsulation and abstraction are interrelated?
  - Abstraction attributes are Encapsulate all the essential properties of the object that are to be created. The attributes are called data members because they hold information.

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.
  - There are different approaches available for problem solving using computer. They are,
        1. Procedural programming
        2. Modular Programming
        3. 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 onsuming.
  - 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.
  - 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

Object Oriented Programming	Procedural programming
➢ In OOP where the program can be decomposed into modules.	➢ Programs are organized in the form of subroutine or sub programs.
➢ Data items are global as well as local (public, private, protected are used). Data and its associated operations are grouped in to single unit.	➢ All data items are global
➢ Programs are designed around the data being operated.	➢ Suitable for small sized software application.
➢ Relationships can be created between similar, yet distinct data types.	➢ Difficult to maintain and enhance the program code as any change in data type needs to be propagated to all subroutinesthat use the same data type. This is time consuming
➢ Example: **C++, Java, VB.Net, Python etc.**	➢ **Example: FORTRAN** and **COBOL**.

2. What are the advantages of OOPs?
Advantages of OOP:
1. Re-usability:
"Write once and use it multiple times" you can achieve this by using class.
2. 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.
3. Easy Maintenance:
It is easy to maintain and modify existing code as new objects can be created with small differences to existing ones
4. 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 Programming has been developed to overcome the drawbacks of procedural andmodular programming. It is widely accepted that object-oriented programming is the most important andpowerful way of creating software.
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

1. Encapsulation
- The mechanism by which the data and functions are bound together into a single unit is known asEncapsulation.
- This encapsulation of data from direct access by the program is called data hiding or information hiding.

2. Data Abstraction
- Abstraction refers to showing only the essential features without revealing background details. Classes use the concept of abstraction to define a list of abstract attributes and function which operate on these attributes.

3. 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.

4. 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.

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

14. Classes and objects
SECTION-A

Choose the correct answer

1. The variables declared inside the class are known as _____
   (A) data functions (B) inline functions **(C) member functions** (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_____functions
   (A) **inline**   (B) Non inline   (C) Outline   (D) Data
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

SECTION-B

Answer to all the questions: **(2 Marks)**

1. What are called members?

➤ The class body contains the declaration of its members (Data member and Member functions).

➤ The class body has three access specifiers are,
   1. private 2. public 3. protected

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
➢ A class specification just defines the properties of a class.	➢ The class variables are called Object.
➢ Define using Class-Keyword	➢ Define data-Type.
➢ Ex:Class student	➢ Ex:int no;

4. Why it is considered as a good practice to define a constructor though compiler can automatically generate a constructor?
- ➢ Constructor is a special initialization member function of a class that is called automatically whenever an instance of a class is declared or created.
- ➢ The main function of the constructor is
    1. To allocate memory space to the object and
    2. To initialize the data member of the class 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 an object.

SECTION-C

Answer to all the questions: (3 Marks)

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

```
#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( );
}
```

ANSWER:
```
#include<iostream>
#include<stdio.h>
```

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```cpp
Class mystud
{ int studid;
char name[20];
public:
mystud( )
{
studid =1001;
}
void register ( ) {cin>>stdid;gets(name);
}
void display ( )
{ cout<<studid<<": "<<name<<endl;}
};
int main( )
{ mystud MS;
MS.register( );
MS.display( );
}
```

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

➢ When the initial values are provided during runtime then it is called dynamic initialization.

Example program to illustrate dynamic initialization

```cpp
#include<iostream>
using namespace std;
class X
{
int n;
floatavg;
public:
X(intp,float q)
{
n=p;
avg=q;
}
voiddisp()
{
cout<<"\n Roll numbe:- " <<n;
cout<<"\nAverage :- "<<avg;
}
};
int main()
{
inta;float b=238;
cout<<"\nEnter the Roll Number";
cin>>a;
cout<<"nEnter the Average";
```

```
cin>>b;
X x(a,b);
x.disp();
return();
}
```
Output:

        Enter the Roll Number 1220
        Enter the Average 98.6
        Roll number: 1220
        Average: 98.6

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

> A constructor can be defined either in private or public section of a class.
> If it is defined in public section of a class, then its object can be created in any function.
> Easy to access other classes compare to others(private, protected).

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

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

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

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

ANSWER:

   i. In Object Oriented Programming, what is Function 1 referred as and when doesit get invoked / called?

> Function 1 is called Destructor. (Class name same as this function 1 name. Also starting with ~ symbol)
> It will be automatically invoked when object goes out of scope. (At the end of a program)

   ii. In Object Oriented Programming, what is Function 2 referred as and when doesit get invoked / called?

> Function 2 is called Constructor. (Class name same as this function 1 name. But not starting with ~ symbol)
> It will be automatically **invoked** when even an object is created an initialized (at the starting of the program)

SECTION-D

Answer to all the questions: **(5 Marks)**

1. Mention the differences between constructor and destructor

CONSTRUCTOR	DESTRUCTOR
➢ The name of the constructor must be same as that of the class.	➢ The Destructor has the same as that of the Class prefixed by the Tilde symbol (~).
➢ The constructor function can be overloaded.	➢ The Destructor function can't be overloaded.
➢ A constructor can have parameter (Arguments) list.	➢ The Destructor cannot have parameter (Arguments)list.
➢ Constructor cannot be inherited. But a derived class can call the base class constructor.	➢ Destructor cannot be inherited.
➢ The constructor is executed automatically when the object is created.	➢ The destructor is executed automatically when the control reaches the end of class scope to destroy the object.
➢ Allocated memory space for the objects.	➢ Destroy the object.

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

```cpp
#include<iostream>
using namespace std;
class RESORT
{
private:
intRno, Days, charges;
charRname[20];
int compute()
{
if ( Days * Charges > 11000 )
return ( Days * Charges * 1.02 );
else
return ( Days * Charges);
}
public:
getinfo()
{
cout<< "\n Enter customer name :";
cin>>Rname;
cout<< "\n Enter charges per day:";
cin>>Charges;
cout<< "\n Enter Number of days:";
cin>>Days;
cout<< "\n Enter Room Number:";
cin>>Rno;
}
dispinfo()
{
cout<< "\n Room Number:" <<Rno;
cout<< "\n Customer name:" <<Rname;
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
```cpp
#include<iostream>
using namespace std;
class student
{
```

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```cpp
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
```

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15. Polymorphism
SECTION-A

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(inti=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 notconsidered for Overloading.
   (D) Destructor function cannot be overloaded.

5. Which of the following is invalid prototype for function overloading
   (A) void fun (intx);   **(B) void fun (intx);**
   void fun (char ch) ;   **void fun (inty);**
   (C) void fun (double d);   (D) void fun (double d);
   void fun (char ch);   void fun (inty);

SECTION-B

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.
   ➢ In other words function overloading means two or more functions in the same scope share the same name but their parameters are different. Inthis situation, the functions that share the same name are said to be overloaded and the process is called 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(int a)
   {

```
            x = a ;
            cout<< "\n parameterized constructor";
    }
```

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

➤ No, the return type of a function does not help in overloading a function. It considers only the arguments.

5. What is the use of overloading a function?

➤ To reduces the number of comparisons in a program and makes the program to execute faster.

➤ Program complexity is reduced.

➤ It also helps the programmer by reducing the number of function names to be remembered.

SECTION-C

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 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.

    Example:

```
        float area ( float radius);                      //function with one argument
        float area ( float half, float base, float height ); //function with two arguments
        float area ( float length , float breadth);      //function with three arguments
```

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

➤ The term operator overloading, refers to giving additional functionality to the normal C++operators like +,++,-,—,+=,-=,*.<,>.

➤ It is also a type of polymorphism in which an operator is overloaded to give user defined meaning to it.

4. Discuss the benefit of constructor overloading?

➤ Function overloading can be applied for constructors, as constructors are special functions of classes.

➤ 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;
}
```

SECTION-D

Answer to all the questions: (5 Marks)

1. **What are the rules for operator overloading?**
   ➢ Precedence and Associativity of an operator cannot be changed.
   ➢ No new operators can be created, only existing operators can be overloaded.
   ➢ Cannot redefine the meaning of an operator's procedure. You cannot change how integers are added. Only additional functions can be to an operator
   ➢ Overloaded operators cannot have default arguments.
   ➢ 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
{
intBookCode ; 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 (intSC,char S[ ],float F) ; //Function 4
};
```

(i) In the above program, what are Function 1 and Function 4 combined together referred as?
   Answer: Constructor
(ii) Which concept is illustrated by Function3? When is this function called/ invoked?
   Answer: Destructor. Executed automatically when object goes out of scope.
(iii) What is the use of Function3?
   Answer: To remove the memory space of the object allocated at the time of creation.
(iv) Write the statements in main to invoke function1 and function2
   Answer: Function 1 invoke →Book() constructor function automatically when object b Created.
   Function 2 invoke →display(float C) function passing a float value.
(v) Write the definition for Function4.
   Answer: Book (int SC, char S[ ], float F)

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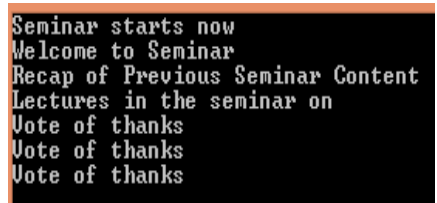
```
                fees=1000;
                BookCode=1;
                strcpy (Bookname,"C++");
```
3. **Write the output of the following program**

```cpp
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:

4. Answer the questions based on the following program

```cpp
#include<iostream>
#include<string.h>
using namespace std;
class comp {
public:
chars[10];
voidgetstring(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()
{
compob, 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.
  Answer: ob and ob1

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

(iii)Name the operator which is over loaded and write the statement that invokes it.
  Answer: Operator overloaded is: = =
    Invoke the statement is: ob = = ob1

(iv)Write out the prototype of the overloaded member function
  Answer: void comp:: operator = = (comp ob)

(v)What types of operands are used for the overloaded operator?
  Answer: User defined

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

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Answer: Constructor not used in this program. (Only default constructor to be executed)

OUTPUT:

```
Enter First String:VIJAY

Enter Second String:VIJAY

Strings are Equal
```

```
Enter First String:VIJAY

Enter Second String:KUMAR

Strings are not Equal
```

16. Inheritance
SECTION- A

Choose the correct answers

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 outsideclass

9. Based on the following class declaration answer the questions (from9.1 o 9.5)

```
class vehicle
{ int wheels;
public:
voidinput_data(float,float);
voidoutput_data();
protected:
int passenger;
};
classheavy_vehicle : protected vehicle {
intdiesel_petrol;
protected:
int load;
protected:
int load;
public:
voidread_data(float,float)
voidwrite_data(); };
```

```
class bus: private heavy_vehicle {
charTicket[20];
public:
voidfetch_data(char);
voiddisplay_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()   (b) read_data() ,output_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**

SECTION- B

Answer to the all questions: **(2 Marks)**

1. **What is inheritance?**
- The mechanism of deriving new class (Derived class) from an existingclass (Base class) is called inheritance.

2. **What is a base class?**
- Existing classes is called Base (parents) class.
- A class that is used as the basis for creating a new class is called a super class or base 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 containsmany base class?**
- **Multiple Inheritance:** Inherits from multiple base classes (more than one parent)
- **Multilevel Inheritance:** Inherits from only one base class (only one parent)

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

public visibility mode	private 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.	- 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

SECTION- C

Answer to the all questions: **(3 Marks)**

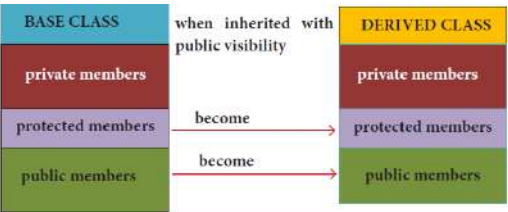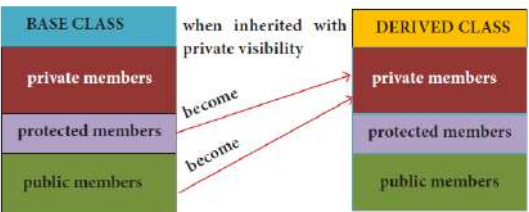1. **What are the points to be noted while deriving a new class?**
The following points should be observed for defining the derived class.

i. The keyword class has to be used

ii. The name of the derived class is to be given after thekeyword 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.

class derived_class_name :visibility_mode base_class_name

{

     //members of derivedclass

};

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

public visibility mode	private 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.	➢ 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 thoughareusedfor reusability of code?**

Polymorphism	Inheritance
Polymorphism is a common interface of multiple forms.	Inheritance is a newly created class using existing class.
It supports overloading(compile) and overriding(run)	It support reusability of code and reduce the size of the code.
Polymorphism implemented only on functions/methods.	Inheritance implemented only in classes.
There are 2 types.	There are 5 types.

4. **What do you mean by overriding?**

When a derived class member function has the same names 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.**

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Some Facts About the execution of constructor in inheritance

➢ Base class constructors are executed first, before the derived class constructor's 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.

SECTION- D

Answer to the all questions: **(5 Marks)**

1. Explain the different types of inheritance.

There are different types of inheritance viz.,

- Single Inheritance
- Multiple inheritance
- Multilevel inheritance
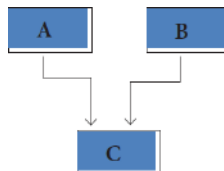- Hybrid inheritance
- Hierarchical inheritance

1. Single Inheritance

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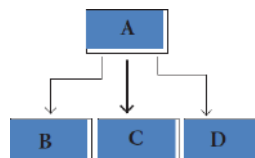

2. Multiple inheritance

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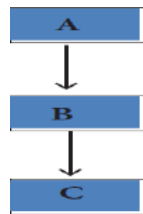

3. Hierarchical inheritance

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


4. 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.

5. Hybrid inheritance

When there is a combination of more than one type of inheritance, it is known as hybrid inheritance. Hence, it may be a combination of Multilevel and Multiple inheritance or Hierarchical and Multilevel inheritance or Hierarchical, Multilevel and Multiple inheritance.
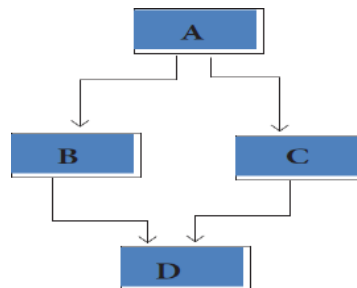

2. **Explain the different visibility mode through pictorial representation**
  ➢ The accessibility of base class by the derived class is controlled by visibility modes.
  ➢ The three visibility modes are private, protected and public. The default visibility mode is private.
  ➢ Though visibility modes and access specifiers look similar, the main difference between them is Access specifiers control the accessibility of the members with in the class whereas visibility modes control the access of inherited members with in the class.
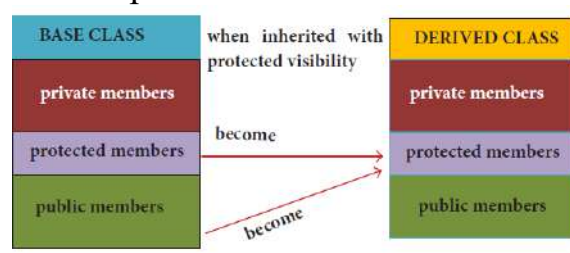
Private visibility mode

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
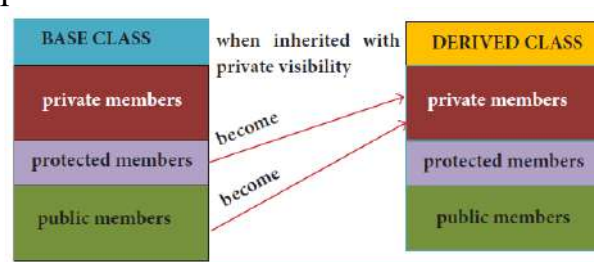

Protected visibility mode

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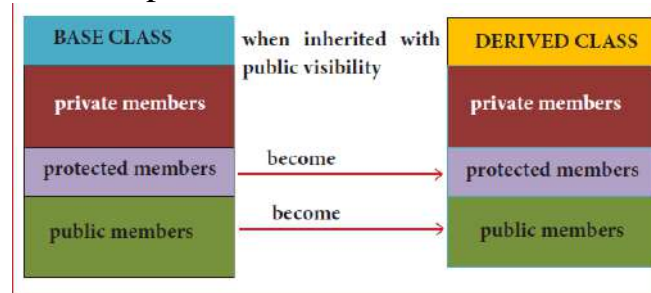
3. **Consider the following c++ code and answer the questions**

```
class Personal
{
intClass,Rno;
char  Section;
protected:
char Name[20];
public:
personal();
voidpentry();
voidPdisplay();
};
classMarks:private Personal
{
float M{5};
protected:
char Grade[5];
public:
Marks();
void M entry();
void M display();
};
classResult:public Marks
{
floatTotal,Agg;
public:
charFinalGrade, 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.
   Private visibility   -Marks class
   Public visibility   -Result class

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 classes – Personal & Marks
Derived classes – Marks & Result

3.5 Give number of bytes to be occupied by the object of the following class:
   (a) Personal - 28 bytes
   (b) Marks   - 53 bytes
   (c) Result   - 82 bytes

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

3.7. Write the names of all member functions accessible from the object of class Result.
Rcalculate(), Rdisplay() →Result class data members
Mentry(), Mdisplay()   →Marks class data members

3.8 Write the names of all members accessible from member functions of class Result.
Total, Agg, FinalGrade, Commernce →Result class data members
M, Grade   →Marks class data members

4. Write the output of the following program

```cpp
#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;}
```
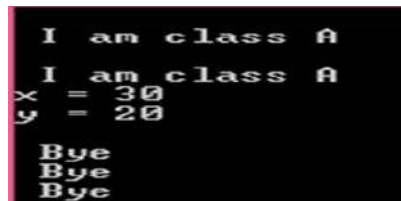
```
~B()
{cout<<endl<<" Bye ";}
void show()
{
cout<<"x = "<<x<<endl;
cout<<"y = "<<y<<endl;
}
};
int main()
{
AobjA;
B objB(30, 20);
objB.show();
return 0;
}
```

OUTPUT:

5. Debug the following 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()
{ B der;
der1:func(); }
```

S.NO	ERROR STATEMENT	CORRECTED STATEMENT
1.	%include(iostream.h)	#include<iostream>
2.	class A()	class A
3.	public;	public:

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4.	int a1,a2:a3;	int a1,a2,a3;
5.	void getdata[]	void getdata()
6.	PUBLIC	public:
7.	voidfunc()	void func()
8.	int b1:b2:b3;	int b1,b2,b3;
9.	A::getdata[];	void A::getdata()
10.	a3=a3;	b3=a3;
11.	cout<<b1<<'\t'<<b2<<'t\'<<b3;	cout<<b1<<"\t"<<b2<<"\t"<<b3;
12.	der1:func();	der1.func();

17. Computer Ethics and Cyber Security
SECTION- A
Choose the best 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

SECTION- B
Answer to all the questions: **(2 Marks)**
1. What is harvesting?
  - A person or programcollects login and password information from a legitimate user to illegally gain access to others' accounts is called harvesting.

2. What are Warez?
  - Commercial programs that are made available to the public illegally are oftencalled warez.

3. Write a short note on cracking.
  - "Cracking" means trying to get into computer systems in order to steal, corrupt, or illegitimately view data.
  - Cracking is where someone edits a program source so that the code can be exploited or modified.

4. Write two types of cyber-attacks.
  - Pharming
  - Phishing

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

SECTION- C

Answer to all the questions: **(3 Marks)**

1. What is the role of firewalls?
- ➢ To monitors and controls incoming and outgoing network traffic based on predefined security rules.
- ➢ To establishes a block between a trusted internal computer network and entrusted computer outside the network.

2. Write about encryption and decryption.

Encryption:
- ➢ Encryption is the process of translating the plain text data (plaintext) into random and mangled data (called cipher-text).

Decryption:
- ➢ Decryption is the reverse process of converting the cipher-text back to plaintext.

3. Explain about proxy server.
- ➢ A proxy server acts as an intermediary between the end users and a web server.
- ➢ 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 or wrong.

Some of the common ethical issues are listed below:
- • Cyber crime
- • Software Piracy
- • Unauthorized Access
- • Hacking
- • Use of computers to commit fraud

SECTION- D

Answer to all the questions: **(5 Marks)**

1. What are the various crimes happening using computer?

Crime	Function
Cyber Terrorism	Hacking, threats, and blackmailing towards a business or a person.
Cyber stalking	Harassing through online.
Malware	Malware or malicious software is any program or file that is harmful to a computer user.
Denial of service attack	Overloading a system with fake requests
Fraud	Computer fraud is the act of using a computer to take or alter electronic data
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.
- ➢ Software Piracy is "unauthorized copying of software".
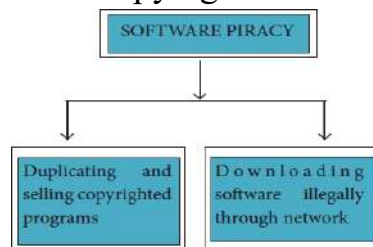
- ➢ An entirely different approach to software piracy is called Shareware; this acknowledges the futility of trying to stop people from copying software and instead relies on people's honesty.
- ➢ Commercial programs that are made available to the public illegally are often called Warez.

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. One of the most common virus is Trojan. A Trojan virus is a program that appears to perform one function (for example, virus removal) but actually performs malicious activity when executed.
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.

18. Tamil Computing

Answer to all the questions:

1. **List the search engines supported by Tamil language.**
   - In the top ten search engines, **Google, Bing** and **Yahoo** take first three places respectively.

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.**
   - Programming languages to develop software in computers and smart phones are available only in English.
   - Now, efforts are taken to develop programming languages in Tamil. 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 is 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.
   - This encoding scheme was registered in IANA (Internet Assigned Numbers Authority) a unit of ICANN.

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.
   - This organization is functioning with the name of "Tamil Virtual Academy".
   - This organization offers different courses regarding Tamil language, Culture, heritage etc., from kindergarten to under graduation level.