HIGHER SECONDARY FIRST YEAR

COMPUTER SCIENCE

BOOK BACK QUESTION & ANSWERS

2025 – 26

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CHAPTER 1: Introduction to Computers

Choose the correct answer:

1. First generation computers used
   (a) **Vacuum tubes** (b) Transistors (c) Integrated circuits (d) Microprocessors
2. Name the volatile memory
   (a) ROM (b) PROM (c) **RAM** (d) EPROM
3. Identify the output device
   (a) Keyboard (b) Memory (c) **Monitor** (d) Mouse
4. Identify the input device
   (a) Printer (b) **Mouse** (c) Plotter (d) Projector
5. …..… Output device is used for printing building plan.
   (a) Thermal printer (b) **Plotter** (c) Dot matrix (d) inkjet printer
6. Which one of the following is used to 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

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 un-processed 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 a CPU?

The CPU has three components which are,

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

4. What is the function of an ALU?

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

5. Write the functions of control unit.

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

6. What is the function of memory?

- The memory unit holds the data and instructions during the processing.
- It has two types: Primary memory and Secondary memory
  - The primary memory is used to store the data temporarily.
  - The secondary memory stores 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.
Ex: Keyboard, Mouse etc…	Ex: Monitor, Printer etc…

8. Distinguish Primary and Secondary memory.

Primary Memory	Secondary memory
The primary memory is used to store the data temporarily.	The secondary memory is used to store the data permanently.
The primary memory is volatile. Example: Random Access Memory (RAM)	The secondary memory is non – volatile. Example: Hard disk, CD-ROM and DVD

Short Answers:

1. **What are the characteristics of a computer?**
   - **Speed** – Computers can work very fast.
   - **Accuracy** - Computers provide accurate results.
   - **Reliability** – Computers are reliable in their performance.
   - **Multi Processing** - Computers can perform various tasks.
   - **Memory** – Computers have the ability to store and retrieve data.
   - **Automation** – Computers perform repetitive tasks automatically.
2. **Write the applications of computer.**
   - Computers are very versatile as they do a lot of different tasks such as storing data, in the field of education, research, travel and tourism, weather forecasting, social networking, e-commerce, booking airlines, railway or movie tickets and even playing games.
3. **What is an input device? Give two examples.**
   - Input unit is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.

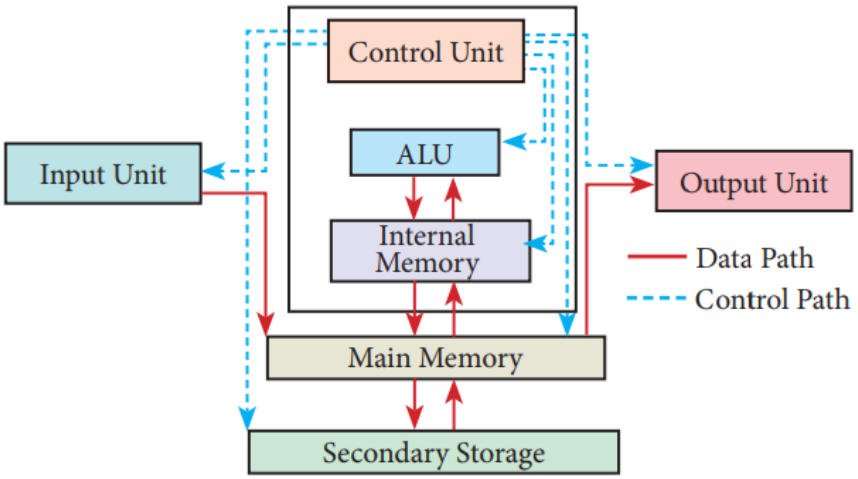
   Example: Keyboard, mouse, etc.
4. **Name any three output devices.**
   - **Monitor:** Monitor is the most commonly used output device to display the information.
   - **Printers:** Printers are used to print the information on papers.
   - **Plotter:** Plotter is used to produce graphical output on papers.
5. **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.
6. **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.
7. **Write the significant features of monitor.**
   - Monitor is the most commonly used output device to display the information. It looks like a TV.
   - Pictures on a monitor are formed with picture elements called PIXELS.
   - Monitors may either be Monochrome which display text or images in Black and White or can be color, which display results in multiple colors.
   - The monitor works with the VGA (Video Graphics Array) card.

Explain in detail:

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

Every task given to a computer follows an Input- Process- Output Cycle (IPO cycle).



Input Unit:

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

  Example: Keyboard, mouse, etc.

Central Processing Unit:

- CPU is the major component which interprets and executes software instructions. It also controls the operation of all other components such as memory, input and output units.
- The CPU has three components which are Control unit, Arithmetic and logic unit (ALU) and Memory unit.
  - The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations.
  - 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.
  - The memory unit holds the data and instructions during the processing.

Memory Unit

- The Memory Unit is of two types which are primary memory and secondary memory.
  - The primary memory is used to temporarily store the programs and data when the instructions are ready to execute.
  - The secondary memory is used to store the data permanently.

Output Unit:

- An Output Unit is any hardware component that conveys information to users in an understandable form.

  Example: Monitor, Printer etc.

2. Discuss the various generations of computers.

Generation	Period	Main Component used	Merits/Demerits
First Generation	1940-1956	**Vacuum tubes**	• Big in size. • Consumed more power. • Machine Language was used.
Second Generation	1956-1964	**Transistors**	• Smaller in size. • Consumed less power. • First operating system was developed. • Machine language as well as Assembly language was used.
Third Generation	1964 - 1971	**Integrated Circuits (IC)**	• Computers were smaller, faster and more reliable. • 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)**	• Computers size was drastically reduced. • Introduction of Artificial Intelligence and Expert Systems.
Sixth Generation	In future		• Parallel and Distributed computing. • Computers have become smarter, faster and smaller. • Development of robotics.

3. Explain the following:

a. Inkjet Printer b. Multimedia projector c. Bar code / QR code Reader

Inkjet Printers:

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

Multimedia Projectors:

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

Bar Code / QR Code Reader:

- A Bar code is a pattern printed in lines of different thickness. It scans the information on the bar codes and transmits to the Computer for further processing.
- The QR (Quick response) Code is the two dimension bar code which can be read by a camera and processed to interpret the image.

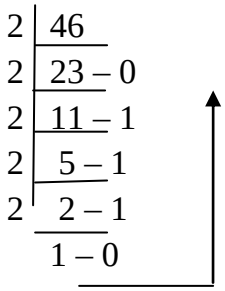
CHAPTER 2: Number Systems

Choose the correct answer:

1. Which refers to the number of bits processed by a computer's CPU?
   A) Byte B) Nibble C) **Word length** D) Bit
2. How many bytes does 1 KiloByte contain?
   A) 1000 B) 8 C) 4 D) **1024**
3. Expansion for ASCII
   A) American School Code for Information Interchange
   B) **American Standard Code for Information Interchange**
   C) All Standard Code for Information Interchange
   D) American Society Code for Information Interchange
4. 2^50 is referred as
   A) Kilo B) Tera C) **Peta** D) Zetta
5. How many characters can be handled in Binary Coded Decimal System?
   A) **64** B) 255 C) 256 D) 128
6. For 1101_2 the equalent 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

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.**
   - Convert given Decimal number into Binary
   - Check if the binary number contains 8 bits , if less add 0 at the left most bit, to make it as 8 bits.
   - Invert all bits (i.e. Change 1 as 0 and 0 as 1)
3. **Convert $(46)_{10}$ into Binary number.**



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

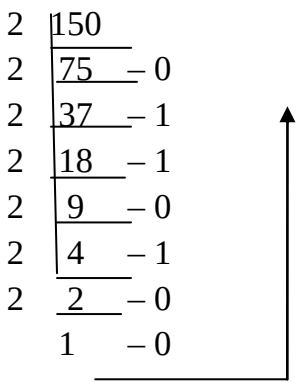
4. **We cannot find 1's complement for $(28)_{10}$. State reason.**
   - Since it is a positive number, we cannot find 1's complement for $(28)_{10}$.
   - 1's complement will come only for negative number.
5. **List the encoding systems that represents characters in memory.**
   - BCD – Binary Coded Decimal
   - EBCDIC – Extended Binary Coded Decimal Interchange Code
   - ASCII – American Standard Code for Information Interchange
   - Unicode
   - ISCII – Indian standard code for Information interchange

Short Answers:

1. **What is radix of a number system? Give example.**
   - 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.
     Example : The decimal number system that we all use is base ten, as it has ten distinct digits (0, 1, 2, 3, 4, 5, 6, 7, 8, 9). Binary system – Radix 2
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.
   - 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.**

Step 1: Convert $(150)_{10}$ into Binary:



$150_{10} = 10010110_2$

Step 2: Convert 10010110_2 to Octal:

010 | 010 | 110

2 2 6

$(150)_{10} = (226)_8$

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 (28) 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).
- Now this coding system is integrated with Unicode.

5. **Add a) $-22_{10}+15_{10}$ b) $20_{10}+25_{10}$**

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

The Binary Equivalent of **22_{10}** :		10110_2
8 – Bit Format:		00010110
1's Complement:		11101001
Add 1 Bit:		1
2's Complement:		11101010
-22	=	1110 1010
15	=	0000 1111
$-22_{10} + 15_{10}$	=	**1111 1001**

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

The Binary Equivalent of **20_{10}** =		10100
The Binary Equivalent of **25_{10}** =		11001
$20_{10} + 25_{10}$	=	**101101**

Explain in detail:

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

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

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

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

Integer Part: $(98)_{10}$

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

The Binary Equivalent of $(98)_{10}$ **: 1100010_2**

Fractional Part: $(0.46)_{10}$

0.46 x 2 = 0.92	0
0.92 x 2 = 1.84	1 ↓
0.84 x 2 = 1.68	1 ↓
0.68 x 2 = 1.36	1 ↓
0.36 x 2 = 0.72	0

The Binary Equivalent of 0.46 : $(0.01110\ldots)_2$

$(98.46)10 = (1100010.\ 0111\ 0\ldots)_2$

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

a) -98 b) -135

(a)

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

The Binary Equivalent of 98_{10} = 1100010_2

8 bit format = 01100010

1's complement = 10011101

Add 1 bit = + 1

2's Complement = 10011110

(b)

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

The Binary Equivalent of 135_{10} = 10000111_2

1'st complement = 01111000

Add 1 bit = + 1

2's Complement = 01111001

3. a) Add 1101010_2+101101_2 b) Subtract 1101011_2 - 111010_2

a) Add 1101010_2+101101_2

1101010
101101
10010111

b) Subtract 1101011_2 - 111010_2

1101011
111010
110001

Part - II - Boolean Algebra

Choose the correct answer:

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

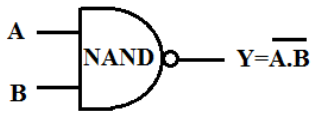
Very Short Answers:

1. What is Boolean Algebra?

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

2. Write a short note on NAND Gate.

- The NAND gate operates an AND gate followed by a NOT gate.
- The output is 0 if both the inputs are 1, otherwise the output is 1.
  The logical symbol of NAND gate and Truth Table:



Inputs		Output
A	B	$Y=\overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0

3. Draw the truth table for XOR gate.

Inputs		Output
A	B	$C = A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

4. Write the associative laws?

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

5. What are derived gates?

- The gates which are derived from the fundamental gates like AND, OR and NOT are called derived gates.
- NAND, NOR, XOR, XNOR are Derived Gates.

Short Answers:

1. Write the truth table of fundamental gates.

There are three fundamental gates namely AND, OR and NOT.

AND gate – Truth Table

Inputs		Output
A	B	C = A . B
0	0	0
0	1	0
1	0	0
1	1	1

OR gate – Truth Table

Inputs		Output
A	B	C = A + B
0	0	0
0	1	1
1	0	1
1	1	1

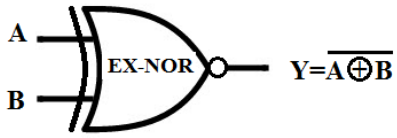
NOT gate – Truth Table

Inputs	Output
A	C = $\bar{A}$
1	0
0	1

2. Write a short note on XNOR gate.

- The XNOR (exclusive – NOR) gate is a combination of XOR gate followed by an inverter.
- The output is 1 if the input are the same, otherwise the output is 0.

The logical symbol of **XNOR** gate and Truth Table:



Inputs		Output
A	B	$Y=\overline{A \oplus B}$
0	0	1
0	1	0
1	0	0
1	1	1

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

- NAND and NOR gates are called as Universal gates because the fundamental logic gates can be realized through them.

4. Write the De Morgan's law.

De-Morgan's Theorem

- $\overline{(A+B)} = \bar{A}\,\bar{B}$

  The complement of a sum is equal to the product of complement

- $\overline{(AB)} = \bar{A} + \bar{B}$

  The complement of a product is the equal to sum of complement

Explain in detail:

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

There are three fundamental gates namely AND, OR and NOT.

AND gate:

- The AND gate can have two or more input signals and produce an output signal.
- The output will be 1 if and only if both inputs are 1; otherwise the output is 0.

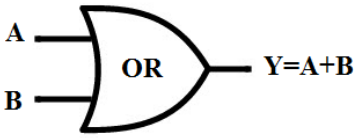
The logical symbol of AND gate and Truth Table:

Inputs		Output
A	B	Y=A.B
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 will be 1 if and only if one or both inputs are 1; otherwise, the output is 0.

The logical symbol of OR gate and Truth Table:

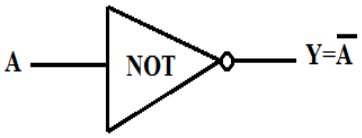


Inputs		Output
A	B	Y=A+B
0	0	0
0	1	1
1	0	1
1	1	1

NOT Gate

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

The logical symbol of NOT gate and Truth Table:

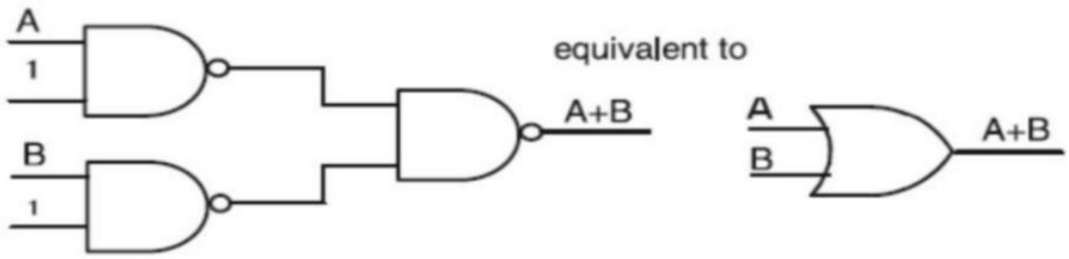


Input	Output
A	Y=$\overline{A}$
0	1
1	0

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

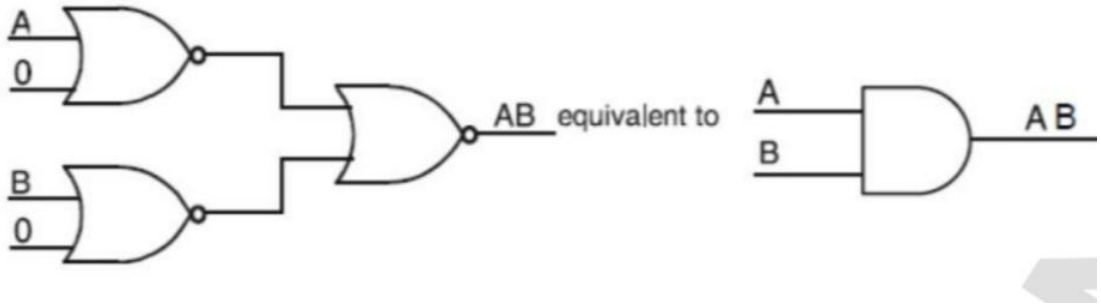
Realization of OR using only NAND's:

The Boolean function of OR is C = A + B. The same can be realized using only NAND gates.



Realization of AND using NOR:

By using only the NOR gates, we can get the output equivalent to the output of AND gate. C = A.B



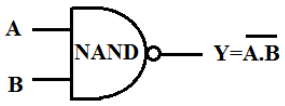
3. Explain the Derived gates with expression and truth table.

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

NAND Gate:

- The NAND gate operates an AND gate followed by a NOT gate.
- The output is 0 if both the inputs are 1, otherwise the output is 1.

The logical symbol of NAND gate and Truth Table:

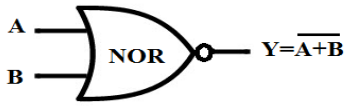


Inputs		Output
A	B	$Y=\overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0

NOR Gate

- The NOR gate circuit is an OR gate followed by an inverter.
- The output is '1' if both the inputs are '0'. Otherwise the output is 0.

The logical symbol of **NOR** gate and Truth Table:



Inputs		Output
A	B	$Y=\overline{A+B}$
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 1 if the inputs are different, but 0 if the inputs are the same.

The logical symbol of **XOR** gate and Truth Table:

Inputs		Output
A	B	Y=A⊕B
0	0	0
0	1	1
1	0	1
1	1	0

XNOR gate.

- The XNOR (exclusive – NOR) gate is a combination of XOR gate followed by an inverter.
- The output is 1 if the input are the same, otherwise the output is 0.

The logical symbol of **XNOR** gate and Truth Table:

Inputs		Output
A	B	$Y=\overline{A \oplus B}$
0	0	1
0	1	0
1	0	0
1	1	1

CHAPTER 3: Computer Organisation

Choose the correct answer:

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

Very Short Answers:

1. **What are the parameters which influence the characteristics of a microprocessor?**
   - Clock speed
   - Instruction set
   - Word size
2. **What is an instruction?**
   - A command which is given to a computer to perform an operation on data is called an **instruction**.
3. **What is a program counter?**
   - The Program Counter (PC) is a special register in the CPU which always keeps the address of the next instruction to be executed.
4. **What is HDMI?**
   - High-Definition Multimedia Interface is an audio/video interface which transfers the uncompressed video and audio data from a video controller, to a compatible computer monitor, LCD projector, digital television etc.
5. **Which source is used to erase the content of a EPROM?**
   - Ultraviolet rays are used to erase the contents of EPROM.

Short Answers:

1. **Differentiate Computer Organisation from Computer Architecture.**

Computer Organisation	Computer Architecture
Computer Organization deals with the hardware components that are transparent to the programmer.	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.**
   - Reduced Instruction Set Computers (RISC)
   - Complex Instruction Set Computers (CISC)
4. **Differentiate PROM and EPROM.**

PROM	EPROM
Programmable read only memory is a non-volatile memory on which data can be written only once.	Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM, but the content can be erased using ultraviolet rays.
Once a program has been written onto a PROM, it remains there forever.	The ultraviolet light clears its contents, making it possible to reprogram the memory.

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 millimeters thick, polycarbonate plastic material.	A DVD is an optical disc
A thin layer of aluminium or gold is applied to the surface.	The disc can have one or two sides, and one or two layers of data per side. Double-layered sides are usually gold-coloured, while single-layered sides are usually silver-coloured, like a CD.
The capacity of an ordinary CD-ROM is 700MB.	Capable of storing up to 4.7 GB of data

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

Flash memory	EEPROM
Flash memory is an electronic non-volatile computer storage medium that can be electrically erased and reprogrammed.	Electrically Erasable Programmable Read Only Memory is a special type of PROM that can be erased by exposing it to an electrical charge.
Flash memory offers fast access times.	EEPROM is slower in performance.

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

Clock Speed

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

Instruction Set

- Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**. This instruction set carries out the following types of operations:
  - Data transfer
  - Arithmetic operations
  - Logical operations
  - Control flow
  - Input/output

Word Size

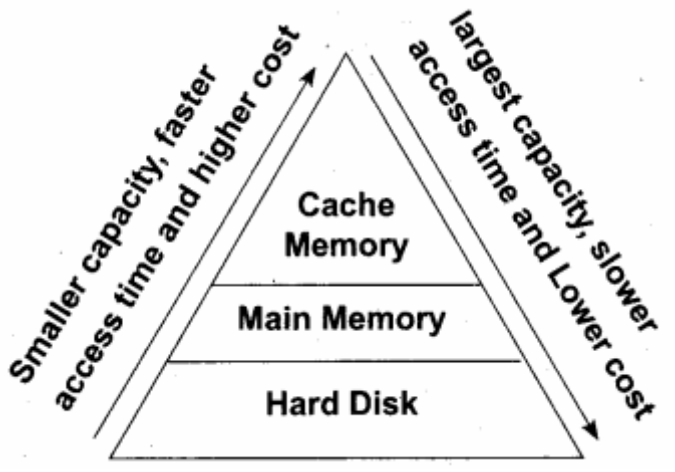
- The number of bits that can be processed by a processor in a single instruction is called its word size.
- Word size determines the amount of RAM that can be accessed by a microprocessor.

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

- 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.

Different memory devices are arranged according to the capacity, speed and cost as shown below:



4. Explain the types of ROM.

Read Only Memory (ROM):

- Read Only Memory refers to special memory in a computer.
- 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. So, ROM is called as a non-volatile memory.

Programmable Read Only Memory (PROM):

- Programmable read only memory is also a non-volatile memory on which data can be written only once.
- Once a program has been written onto a PROM, it remains there forever.

Erasable Programmable Read Only Memory (EPROM):

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

Electrically Erasable Programmable Read Only Memory (EEPROM):

- Electrically Erasable Programmable Read Only Memory is a special type of PROM that can be erased by exposing it to an electrical charge.
- Comparing with all other types of ROM, EEPROM is slower in performance.

CHAPTER 4: Theoretical concepts of Operating System

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. Which of the following Operating systems support Mobile Devices?
   A) Windows 7 B) Linux C) BOSS D) **iOS**
6. File Management manages
   A) Files B) Folders C) Directory systems D) **All the Above**
7. Interactive Operating System provides
   A) **Graphics User Interface (GUI)** B) Data Distribution
   C) Security Management D) Real Time Processing
8. An example for single task operating system is
   A) Linux B) Windows C) **MS-DOS** D) Unix
9. The File management system used by Linux is
   A) **ext2** B) NTFS C) FAT D) NFTS

Very Short Answers:

1. **List out any two uses of Operating System?**
   - Easy interaction between the users and computers.
   - Controlling Input and Output Devices.
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.
     Example: Windows, Linux and UNIX .
3. **What is a GUI?**
   - The GUI is a window based system with a pointing device to direct I/O, choose from menus, and make selections and a keyboard to enter text. Its vibrant colours attract the user very easily.
4. **What are the security management features available in Operating System ?**
   - File access level
   - System level
   - Network level
5. **What is multi-processing?**
   - This is a one of the features of Operating System. It has two or more processors for a single running process (job).
   - Processing takes place in parallel is known as parallel processing.
6. **What are the different Operating Systems used in computer?**
   - UNIX
   - Linux
   - Mac OS
   - MS-DOS
   - Microsoft Windows

Short Answers:

1. **What are the advantages and disadvantages of Time-sharing features?**
   Advantages:
   - Performs multiple tasks simultaneously.
   - Many applications are run at regular intervals without interruption.

   Disadvantages:
   - It consumes much resource, so it needs special operating systems.
   - Sometimes the operating system may fail due to too many users and multiple applications running at the same time.
2. **List out the key features of Operating system.**
   - User Interface (UI)
   - Memory Management
   - Process management
   - Security Management
   - Fault Tolerance
   - File Management
3. **Write a note on Multiprocessing.**
   - This is a one of the features of Operating System.
   - It has two or more processors for a single running process (job).
   - Processing takes place in parallel is known as parallel processing. Since the execution takes place in parallel, this feature is used for high speed execution which increases the power of computing.

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 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.**

   - 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 of any product is to satisfy the customer. The User Interface is also to satisfy the customer.
   - The user interface should reduce number of errors committed by the user

3. **Explain the process management algorithms in Operating System.**

   FIFO (First In First Out) Scheduling:

   - This algorithm is based on queuing technique.
   - Example: Technically, 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.

   SJF (Shortest Job First) Scheduling:

   - This algorithm works based on the size of the job being executed by the CPU.
   - Example: Consider two jobs A and B.1) A = 6 kilo bytes 2) B = 9 kilo bytes. First the job "A" will be assigned and then job "B" gets its turn.

   Round Robin Scheduling:

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

   Based On Priority:

   - The given job (process) is assigned based on a Priority. The job which has higher priority is more important than other jobs.
   - Example: 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.

CHAPTER 5: Working with Windows Operating System

Choose the correct answer:

1. From the options given below, choose the operations managed by the operating system.
   (a) Memory (b) Processes
   (c) Disks and I/O devices (d) **all of the above**
2. Which is the default folder for many Windows Applications to save your file?
   (a) **My Document** (b) My Pictures
   (c) Documents and Settings (d) My Computer
3. Under which of the following OS, the option Shift + Delete – permanently deletes a file or folder?
   (a) **Windows 7** (b) MS-DOS
   (c) Linux (d) Android 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

Very Short Answers:

1. What is known as Multitasking?

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

2. What are called standard icons?

- The icons which are available on desktop by default while installing Windows OS are called standard icons.
- The standard icons available in all Windows OS are My Computer, Documents and Recycle Bin.

3. Differentiate Files and Folders.

Files	Folders
All types of information are stored in the form of files in the computer.	Folders are containers of files that is used to organize files.

4. Differentiate Save and save As option.

Save	save As
Save option is used to save a new document with name.	Save As option is used to save an already existing document with a new name.

5. How will you Rename a File?

- Select the File you wish to Rename.
  - Click File→ Rename. (or)
  - Click the right mouse button over the file or folder and Select Rename from the pop-up menu (or)
  - Press F2 .
- Type in the new name. To finalize the renaming operation, press Enter.

Short Answers:

1. What are the functions of Windows Operating system.

- Access applications on the computer (word processing, games, spread sheets, calculators and so on).
- Load any new program on the computer.
- Manage hardware such as printers, scanners, mouse, digital cameras etc.,
- File management activities (For example creating, modifying, saving, deleting files and folders).
- Change computer settings such as colour scheme, screen savers of your monitor etc.,

2. Write a note on Recycle bin.

- Recycle bin is a special folder to keep the files or folders deleted by the user, which means you still have an opportunity to recover them.
- The user cannot access the files or folders available in the Recycle bin without restoring it.

3. **Write a note on the elements of a window.**
   - **Title Bar** : The title bar will display the name of the application and the name of the document opened.
   - **Menu Bar**: The menu bar is seen under the title bar.
   - **The Workspace:** The workspace is the area in the document window to enter or type the text of your document.
   - **Scroll bars:** The scroll bars are used to scroll the workspace horizontally or vertically.
   - **Corners and borders:** The corners and borders of the window helps to drag and resize the windows.
4. **Write the two ways to create a new folder.**

   Method I:
   - Open **Computer Icon**.
   - Open any drive where you want to create a new folder.
   - Click on File → New → Folder.
   - A new folder is created with the default name "New folder".
   - Type the name you want and press Enter Key.

   Method II:
   - In the Desktop, right click → New → Folder.
   - A Folder appears with the default name "New folder".
   - Type the name you want and press Enter Key
5. **Differentiate copy and move.**

Copy	Move
It means to make a duplicate copy of a file.	It means to transfer a file from one location to another.
The original file remains at the source location.	The original file is moved to the destination location.
It uses the Copy & Paste option. Click Edit → Copy (or) Ctrl + C. Click Edit → Paste (or) Ctrl + V.	**It uses the Cut & Paste option.** Click Edit → Cut (or) Ctrl + X. Click Edit → Paste (or) Ctrl + V.

Explain in detail:

1. Explain the versions of Windows Operating System.

Version	Year	Specific Feature
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.
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. • 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.
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. • Served as common platform for mobile and computer.
Windows 10	2015	• Start Button was added again. • Multiple desktop.

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

Using the search box on the Start menu:

- 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.

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 the 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 sub-menu.
- A shortcut for the file or folder will now appear on your desktop and you can open it from the desktop in the same way as any other icon.

CHAPTER 6: Specification and Abstraction

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) Swapping 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

Very Short Answers:

1. **Define an algorithm.**
   - An algorithm is a sequence of instructions to accomplish a task or solve a problem.
2. **Distinguish between an algorithm and a process.**

Algorithm	Process
An algorithm is a sequence of instructions to accomplish a task or solve a 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.**
   - -- farmer, goat,grass,wolf = L,L,L,L.
   - -- farmer,goat: = R,R
   - -- farmer,goat,grass,wolf = R,R,L,L
4. **Specify a function to find the minimum of two numbers.**
   - – – minimum (a,b)
   - – – inputs : a and b are real numbers.
   - – – outputs: a is minimum number if (a<b) else b.
5. **If √2 = 1.414, and the square_root() function returns -1.414, does it violate the following specification?**

   -- square_root (x)
   -- inputs: x is a real number , x ≥ 0
   -- outputs: y is a real number such that y2=x

   - Yes, it violates the specification.

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.
     Example: goat, grass and wolf problem.
2. **What is the format of the specification of an algorithm?**
   - The goal of the algorithm is to establish the relation between the input and the desired output.
     - algorithm_name (inputs)
     - -- inputs : P
     - -- outputs: Q
3. **What is abstraction?**
   - Abstraction is the process of ignoring or hiding unnecessary details and modeling a problem only by its essential features.

4. **How is state represented in algorithms?**
   - State is a basic and important abstraction.
   - Computational processes have state.
   - A computational process starts with an initial state. As actions are performed, its state changes. It ends with a final state.
   - State of a process is abstracted by a set of variables in the algorithm.
5. **What is the form and meaning of assignment statement?**
   - Assignment statement is used to store a value in a variable.
   - It is written with the variable on the left side of the assignment operator and a value on the right side.
   - Variable : = Value
6. **What is the difference between assignment operator and equality operator?**

Assignment operator	Equality operator
= is assignment operator.	= = is an equality operator.
It is used to store a value in a variable. Ex: a = 2	It is used to compare the values of both the variables and the result is true or false. Ex: a = = b

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.**

   Solution:
   - hypotenuse (a, b)
   - – – inputs: a, b are real numbers, a > 0, b > 0
   - – – outputs: c2 = a2 + b2 wrhere c is real number, c > 0
2. **Suppose you want to solve the quadratic equation ax2 + bx + c = 0 by an algorithm.**

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

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

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

   Solution:
   - quadratic_solve (a, b, c)
   - inputs : a, b, c are real numbers, a ‡ 0
   - outputs: x is a real number, such that,

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

   - $b^2 - 4ac >= 0$

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.**

Solution:

- Let the variables a, b, c represent the glass A, glass B and Glass C respectively. Variables a, b, c can store values A, G or E.
- It produces the exchange of a, b by using third variable c as the output.
- Now the specification of the algorithm is:
  - Exchange (a,b)
  - -- inputs : a, b = A, G
  - -- outputs: a, b = G, A

    c := a

    a := b

    b := c

CHAPTER 7: Composition and Decomposition

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

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

   1 --i, j = 0, 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

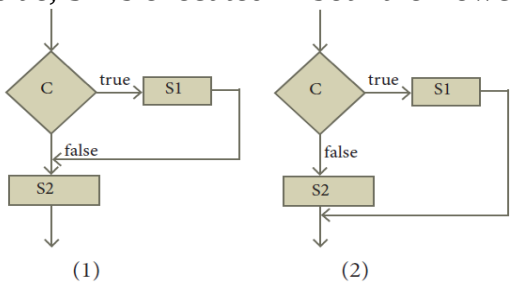
   (a) S1 (b) **S2** (c) S3 (d) none

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

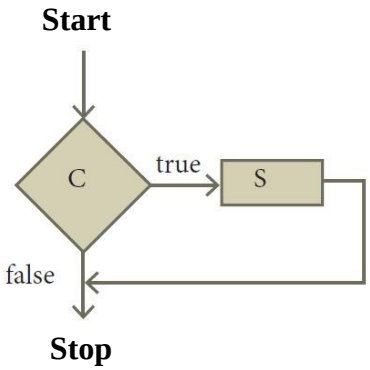
   (a) 4 (b) **5** (c) 6 (d) 0

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, labeled true and false. **EX:** a>b	A statement is contained in a rectangular box with a single outgoing arrow, which points to the box to be executed next. **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 step-by-step sequence of statements to solve a problem.	An algorithm expressed in a programming language is called a program.
Can't run on computers.	Can be run on computers.
Syntax is not compulsory.	Must be follow the syntax.

5. Why is function an abstraction?

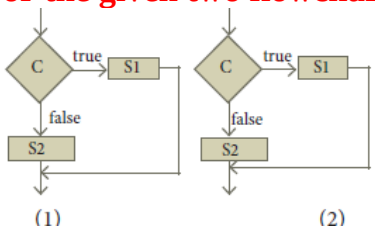
- A function is an abstraction of a subproblem, and specified by its input property, and its input-output relation.
- Users of function need to know only what the function does, and not how it is done. So it is abstract.

6. **How do we refine a statement?**

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

Short Answers:

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



(1) (2)

(i)
```
if C
   S1
S2
```

(ii)
```
if C
   S1
else
   S2
```

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

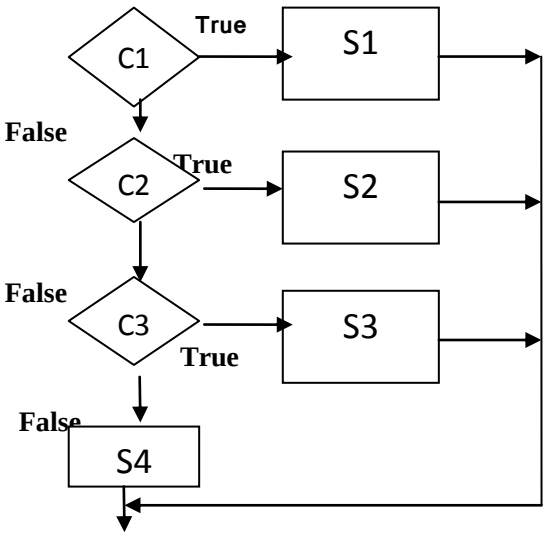
```
1    S1
2    -- C is false
3    if C
4    S2
5    else
6    S3
7    S4
```

- **Control flow: S1; S3; S4**

3. **What is case analysis?**
   - Case analysis statement generalizes it to multiple cases.
   - Case analysis splits the problem into an exhaustive set of disjoint cases. For each case, the problem is solved indenpendently.
   - If C1, C2 and C3 are conditions and S1, S2, S3 and S4 are statements, a 4-case analysis statement has the form,

```
case C1
   S1
case C2
   S2
case C3
   S3
else
   S4
```

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



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

(1) n + n

```
Double  (n)
- - input : n
- - output : n + n
result := n + n
```

(2) 2 x n

```
double(n)
- - input : n
- - output : 2 * n
result := 2 * n
```

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.**

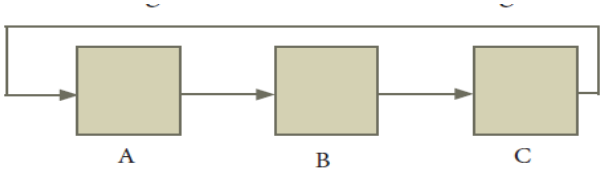
Specification:

- Exchange (a, b)
- – – inputs: a, b : = APPLE, GRAPE
- – – outputs: a, b : = GRAPE, APPLE

State representation:

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.**



Specifications:

- Circulate (A,B,C)
- – – inputs:
  A, B, C all are real numbers
- – – outputs:
  A, B,C all are real numbers
  T:= C
  C:= B
  B:= A
  A:= T

Algorithm:

- Circulate (A,B,C)
- T:= C
- C:= B
- B:= A
- A:= T

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.**

(a) Model: Let a, b, c be the variables whose maximum values are 8L, 5L and 3L respectively.

Initial State: a, b, c := 8, 0, 0

Final State: a, b, c := 4, 4, 0

(b) specification:

decant

– – inputs: a, b, c : = 8, 0, 0

– – outputs: a, b, c : = 4, 4, 0

(c) algorithm:

Let us assume that a: = b denotes oil in b is poured into a bottle until either "a" is full or "b" becomes empty.

decant (a, b, c)

– – a, b, c : = 8, 0, 0

b : = a

– – a, b, c : = 3, 5, 0

c : = b

– – a, b, c : = 3, 2, 3

a : = c

– – a, b, c : = 6, 2, 0

c : = b

– – a, b, c : = 6, 0, 2

b : = a

– – a, b, c : = 1, 5, 2

c : = b

– – a, b, c : = 1, 4, 3

a : = c

– – a, b, c: = 4, 4, 0

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

Step-by-step execution:

Iteration	f = f * i	i = i +1	Condition: **while i ≤ n**
0	1	1	1 ≤ **4 (True)**
1	f = 1 x 1 = 1	i = 1 + 1 = 2	2 ≤ **4 (True)**
2	f = 1 x 2 = 2	i = 2 + 1 = 3	3 ≤ **4 (True)**
3	f = 2 x 3 = 6	i = 3 + 1 = 4	4 ≤ **4 (True)**
4	f = 6 x 4 = 24	i = 4 + 1 = 5	5 ≤ **4 (False)**

Output: f = 24

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 a10?
   (a) 11 (b) **10** (c) 9 (d) 8

Very Short Answers:

1. **What is an invariant?**
   - If 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 for 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?**
   - No, the loop condition **does not affect the loop invariant**. Because the loop invariant is true at four points.
4. **What is the relationship between loop invariant, loop condition and the input-output recursively.**
   - Establish the loop invariant at the start of the loop.
   - The loop body should update the variables, so as to progress toward the end and maintain the loop invariant, at the same time.
   - When the loop ends, the termination condition and the loop invariant should establish the input-output relation.
5. **What is recursive problem solving?**
   - Using recursion, we can solve a problem with a given input, by solving the instances of the problem with a part of the input.
   - To solve a problem recursively, the solver reduces the problem to sub-problems, and calls another instance of the solver, known as sub-solver, to solve the sub-problem.
6. **Define factorial of a natural number recursively.**

```
factorial (n)
- - inputs: n
- - outputs: f
if n = 0
  f = 1
else
  f = n * factorial(n-1)
```

   - **For example**, the **factorial** of 5 is 5*4*3*2*1= 120.

CHAPTER 9: Introduction to C++

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

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. Ex: continue, break, while, for
   - No, 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) 04.1 4 - Real constant (Floating Point)
4. **Write the following real constants into the exponent form:**

   (i) 23.197 - 2.3197E1
   (ii) 7.214 - 0.7214E1
   (iii) 0.00005 - 0.5E-4
   (iv) 0.319 - 3.19E-1
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	**(d)**
(b) Separators	(2) Remainder of a division	**(a)**
(c) Stream extraction	(3) Punctuators	**(b)**
(d) Lexical Units	(4) get from	**(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:** name, mark, num etc..

2. **Is C++ case sensitive? What is meant by the term "case sensitive"?**
   - Yes. C++ is a case sensitive programming language.
   - It treats upper-case and lower-case characters differently.
3. **Differentiate "=" and "==".**

=	= =
= is a **Assignment Operator.**	= = is a **Equality Operator.**
Assign a value of a Variable. **Ex: a = 5**	To Indicate Two Operands is Equal. **Ex: a= = b**

4. **What is the use of a header file?**
   - The header file iostream should include in every C++ program to implement input / output functionalities.
   - In simple words, iostream header file contains the definition of its member objects cin and cout. If you fail to include iostream in your program, an error message will occur on cin and cout, and we will not be able to get any input or send any output.
5. **Why is main function special?**
   - 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.

Explain in detail:

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

Binary Operators - Require two operands. **C++ Operators are classified as:**

- **Arithmetic Operators:** Arithmetic operators to perform simple arithmetic operations like addition, subtraction, multiplication, division etc.,

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

- **Relational Operators:** Relational operators are used to determine the relationship between its operands. The result will be a Boolean value.

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

- **Logical operators :** A logical operator is used to evaluate logical and relational expressions.

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

- **Assignment Operator:** Assignment operator is used to assign a value to a variable which is on the left hand side of an assignment statement. = (equal) is commonly used as the assignment operator in all computer programming languages. EX: a = 10

2. What are the types of Errors?

Syntax Error:

- Syntax is a set of grammatical rules to construct a program.
- Syntax errors occur when grammatical rules of C++ are violated.
  Example: **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**.
  Example: **int i;**
  i = i + 5;
  Variable i does not have an initial value.

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

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**

Very Short Answers:

1. **Write a short note on const keyword with an example.**
   - **const** is the keyword used to declare a constant.
   - const keyword modifies / restricts the accessibility of a variable. So, it is known as Access modifier. **For example, int num = 100;**
2. **What is the use of setw( ) format manipulator?**
   - Setw() format manipulator is used to set 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 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.
   - **Usage:** Reference variable name is assigned the value of a previously declared variable.
5. **Consider the following C++ statement. Are they equivalent?**
   char ch = 67; char ch = 'C';
   - Yes, they are equivalent because ASCII code of 'C' is 67.
6. **What is the difference between 56L and 56?**
   - 56L - is a Long Integer Number - 4 Bytes
   - 56 - is a Integer Number - 2 Bytes
7. **Determine which of the following are valid constant? And specify their type.**
   (i) 0.5 (ii) 'Name' (iii) '\t' (iv) 27,822

   (i) 0.5 - Valid Floating Constant
   (ii) 'Name' - Invalid String Constant (Enclosed within Double quotes)
   (iii) '\t' - Valid. Character 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.**
   Eg: x=2.5 , y=1.2 then result z=3(it must be integer)

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

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 are Invalid.
    - Special Symbols are not allowed in the integer values (Commas, Open and Close Brackets)

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.,
- The symbols which are used to do some mathematical or logical operations are called as **Operators.**

(i) Unary Operators - Require only one operand Ex: a ++
(ii) Binary Operators - Require two operands Ex: a + b

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

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

(i) n = x + y / x;	**(ii) z = m * x + y;**	**(iii) z *= x * m + x;**
n = 5 + (4 / 5) n = 5 + 0.8 **n = 5.8**	z = (2.5 * 5) + 4 z =12.5 + 4 z = 16.5 **z = 16** (z – is integer)	z=z*(x*m+x) z = 16*(5 * 2.5 + 5 z = 16*(12.5 + 5 z = 16*17.5 **z = 280**

CHAPTER 10: Flow of Control

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 be enclosed within:
   (A) **{ }** (B) [ ] (C) ( ) (D) < >
3. The set of statements that are executed again and again in iteration is called as:
   (A) condition (B) loop (C) statement (D) **body of loop**
4. The multi way 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 (int i=0; i<10; i++)
   (A) 0 (B) **10** (C) 9 (D) 11
7. Which of the following is the exit control loop?
   (A) switch (B) while (C) **do…while** (D) if…else
8. Identify the odd one from the keywordsof jump statements:
   (A) break (B) **switch** (C) goto (D) continue
9. Which of the following is called entry control loop?
   (A) do-while (B) switch (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

Very Short Answers:

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 it's types?**
   - The selection statement means the statement (s) are executed depends upon a condition. If a condition is true, a true block is executed otherwise a false block is executed. This statement is also called decision statement.
   - **Types:** If, if else, Nest if, if -else-if, The ?: Alternative to if- else, Switch statement
3. **Correct the following code segment:**

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

   - **Correct code :**

```
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?

   Output:

   (i) Leap (ii) Not Leap year (iii) 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.**

   coding:

```
for (int i =21; i <=30 ; i++)
    cout << i <<'\t';
```

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

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

8. **Compare an if and a ? : operator.**

if	? : Operator
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

Short Answers:

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

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

conditional statement: **if (x >= 10)? a=m+5 : a=m;** (or)
a = (x>=10)? m+5 : m;

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

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

correct code:

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

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

Coding:

```
#include<iostream>
using namespace std;
int main( )
{
int n;
cout<<"Enter the Table number to print : ";
cin>>n;
for(int i=1;i<=10;i++)
cout<<i<<"x"<<n<<"="<<i*n<<endl;
return 0;
}
```

Output: **Enter the Table number to print : 8**

```
1 X 8 = 8
2 X 8 = 16
3 X 8 = 24
4 X 8 = 32
5 X 8 = 40
6 X 8 = 48
7 X 8 = 56
8 X 8 = 64
9 X 8 = 72
10 X 8 = 80
```

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.
- It provides an easy way to dispatch execution to different parts of code based on the value of the expression.
- The switch statement replaces multiple if-else sequence.

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

```
#include<iostream>
using namespace std;
int main( )
{
    for (int i=1; i<=40 ; i+=3)
    cout << i<<' , ';
    return 0;
}
```

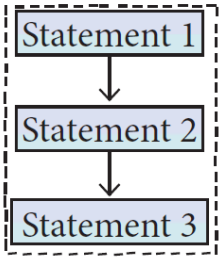
Explain in detail:

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.

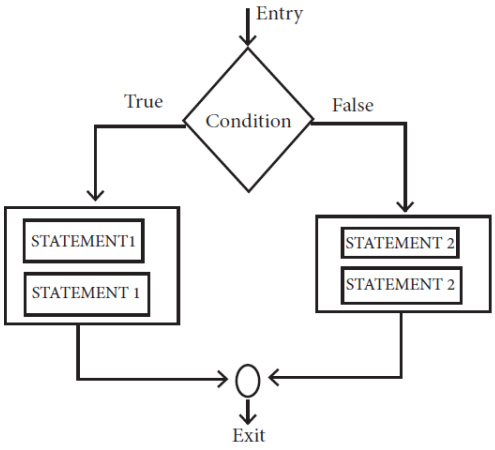
Sequence statement:

- The **sequential statement** are the statements, that are executed one after another only once from top to bottom.
- These statements do not alter the flow of execution. These statements are called as sequential flow statements. They always end with a semicolon (;).



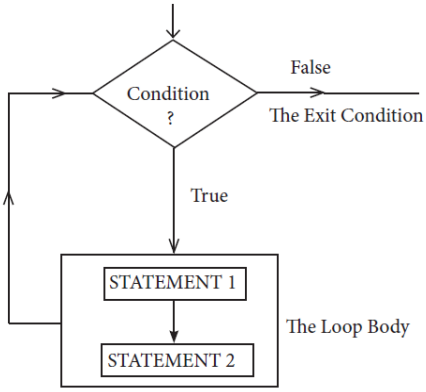
Selection statement:

- The selection statement means the statement (s) executed depend 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.**



Iteration statement:

- The **iteration statement** is a set of statement that are repetitively executed based upon a conditions.
- If a condition evaluates to true, the set of statements (true block) is executed again and again. As soon as the condition becomes false, the repetition stops. This is also known as **looping statement** or iteration statement.



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

- In an entry-controlled loop, first the test-expression is evaluated and if it is nonzero, the body of the loop is executed otherwise the loop is terminated.

for loop :

- The for loop is a entry- controlled loop and is the easiest looping statement which allows code to be executed repeatedly.
- It contains three different statements:
  - Initialization
  - condition or test-expression and
  - update expression(s))
- The three statements are separated by semicolons.

The general syntax is:

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

Example: C++ program to display numbers from 0 to 9 using for loop

```
#include<iostream>
using namespace std;
int main( )
{
for (int i = 0; i<10 ; i++)
cout << i<<’  ’;
return 0;
        }
```

Output: 0 1 2 3 4 5 6 7 8 9

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

Coding:

```
#include<iostream>
using namespace std;
int main()
{
int n1, n2, i, gcd=1, lcm=1;
cout<<"Enter two numbers you want to find the GCD and LCM of : "<<endl;
cin>>n1>>n2;
for( i=1;i<=1000;i++)
{
if((n1%i==0) && (n2%i==0))
{
gcd=i;
}
}
lcm=(n1*n2)/gcd;
cout<<"The LCM of the given two number is : "<<lcm<<endl;
cout<<"The GCD of the given two number is : "<<gcd<<endl;
return 0;
}
```

Output:

```
Enter two numbers you want to find the GCD and LCM of:
10
20
The LCM of the given two number is 20
The GCD of the given two number is 10
```

4. **Write a program to find sum of the series:** $S = 1 + x + x^2 + ... + x^n$

Coding:

```
#include<iostream>
#include<math.h>
using namespace std;
int main()
{
int i,x,n,s=0;
cout<<"Enter the value of x:";
cin>>x;
cout<<"Enter the Number of terms:";
cin>>n;
for(i=0;i<=n;i++)
s=s+pow(x,i);
cout<<"The Sum = " <<s;
return 0;
}
```

Output:

```
Enter the value of x : 5
Enter the Number of terms : 2
The Sum = 31
```

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

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

Coding:

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

Output:

```
Enter the value of x: 3
Enter till what power you want : 4
The sum of the series is :-4.875
```

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

Coding:

```
include<math.h>
using namespace std;
int main()
{
int i,n;
float x,sum=0;
cout<<"x+x^2/2+x^3/3+…+x^n/n";
cout<<"\n Enter value of x:";
cin>>x;
cout<<"\n Enter value of n:";
cin>>n;
for(i=1;i<=n;++i)
sum+=pow(x,i)/i;
cout<<"\n sum="<<sum;
}
```

Output:

```
x+x^2/2+x^3/3+…+x^n/n
Enter value of x: 5
Enter value of n: 3
sum = 59.1667
```

CHAPTER 11: Functions

Choose the correct answer:

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

Very Short Answers:

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 string as its argument and returns its length. The length does not include the null(\0) character.
3. **What are importance 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?**
   - Parameters or Arguments are the means to pass values from the calling function to the called function.

     Types:
     - The variables used in the function definition as parameters are known as **formal parameters.**
     - 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.

Short Answers:

1. **What is Built-in functions ?**
   - C++ provides a rich collection of functions ready to be used for various tasks.
   - The tasks to be performed by each of these are already written, debugged and compiled, their definitions alone are grouped and stored in files called **header files**. Such ready-to-use sub programs are called **pre-defined functions or built-in functions.**
2. **What is the difference between isupper() 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.

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:
   - 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 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 default arguments ? Give example.**
   - In C++, one can assign default values to the formal parameters of a function prototype. The Default arguments allow to omit some arguments when calling the function.

     When calling a function,
     - For any missing arguments, complier uses the values in default arguments for the called function.
     - The default value is given in the form of variable initialization.
       Example : **void defaultvalue(int n1=10, n2=100);**

Explain in detail:

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 fun(int x)
{
        x=20;
}
int main( )
{
        int a=10;
        fun(a);
        cout<<a;
}
```

   Output : **10**

2. **What is Recursion? Write a program to find the 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: 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;
}
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. **Write a program to accept any integer number and reverse it.**

Coding:

```
#include<iostream>
using namespace std;
int main()
{
int num,n,digit,rev=0;
cout<<"Enter a number:";
cin>>num;
while(num>0)
{
digit=num%10;
rev=(rev*10)+digit;
num=num/10;
}
cout<<"Reversed number is:"<<rev<<endl;
return 0;
}
```

Output:
```
Enter a number: 1234
Reversed number is: 4321
```

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

i. A Function with return value and without parameter:

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

Example Program:

```
#include<iostream>
using namespace std;
int display()
{
int a=10, b=5, s;
s=a+b;
return s;
}
int main()
{ int m=display();
cout<<"\nThe Sum="<<m;
return(0);
}
```

Output : The Sum=15

ii. **A Function with return value and with parameter:**

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

Example Program:

```
#include<iostream>
using namespace std;
int display(int x, int y)
{
int s=x+y;
return s;
}
int main()
{
int a=45,b=20;
int s=display(a,b);
cout<<"\nExample:Function with Return Value and with Arguments";
cout<<"\nThe Sum of Passed Values: "<<s;
return(0);
}
```

Output :

```
Example: Function with Return Value and with Arguments
The Sum of Passed Values: 65
```

5. 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** - Inside a block which is called local variables.
  2. **Function scope** - Inside a function is called function variables.
  3. **File scope** - Outside of all functions which is called global variables.
  4. **Class scope** - 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 { }.
- 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.

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;
int sum;                          <-------  File Scope
void add(int x, int y)
{
int z=30                          <-------  Function Scope
sum=x+y+z;
}
int main()
{
int a=10;
{
int b=20;                         <-------  Local Scope
add(a,b);
}
cout<<sum;
}
```

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

CHAPTER 12: Arrays and Structures

Choose the correct answer:

1. Which of the following is the collection of variables of the same type that an referenced by a commonname ?
   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 accept the value?
   a) 2 b) 3 c) **4** d) 5
4. By default, a string ends with which character?
   a) **\o** b) \t c) \n d) \b
5. Structure definition is terminated by
   (a) : (b) } (c) **;** (d) ::
6. What will happen when the structure is declared?
   (a) it will not allocate any memory (b) it will allocate the memory
   (c) it will be declared and initialized (d) **it will be only declared**
7. A structure declaration is given below.

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

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

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

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

Very Short Answers:

1. **What is Traversal in an Array?**
   - Accessing each element of an array at least once to perform any operation is known as 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.**

   The declaration of a 2-D array is

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

   - data-type - any valid C++ data-type,
   - array_name - the name of the 2-D array,
   - row-size - the number of rows
   - col-size - the number of columns in the 2-D array.
4. **Define structure .What is its use?**
   - Structure is a user-defined which has the combination of data items with different data types.
   - 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;
   - Spaces are missing at two places.
   - Structure name given wrongly.

   Corrected Structure:

```
struct Employee
{
int eno;
char ename[20];
char dept;
} Employee e1,e2;
```

Short Answers:

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. An array is also a derived data type in C++.

   There are different types of arrays used in C++. They are:
   - One-dimensional arrays
   - Two-dimensional arrays
   - Multi-dimensional arrays
2. **Write note an Array of strings.**
   - An array of strings is a two-dimensional character array.
   - The size of the first index (rows) denotes the number of strings and the size of the second index (columns) denotes the maximum length of each string.

   Declaration of 2D Array: char Name[6][10];

   Initialization:

```
char Name[6][10] = {"Vijay", "Raji", "Suji", "Joshini", "Murugan", "Mani"};
```

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(int i=0;i<20;i++)
{ …….. //accept student details }
for(int i=0;i<20;i++)
{
…….. //check for name starts with letter "S"

……. // display the detail of the checked name
}
return 0;
}
```

Answer:

```
struct student {int examno,lang,eng,phy,che,mat,csc,total;char name[15];};
int main()
{
student s[20];
for(int i=0;i<20;i++)
{
cout<<"Enter the students Exam Number:";
cin>>s[i].examno;
cout<<"Enter the students Name one by one:";
cin>>s[i].name;
cout<<"Enter the Students Marks:";
cin>>s[i].lang>>s[i].eng>>s[i].phy>>s[i].che>>s[i].mat>>s[i].csc;
s[i].total = s[i].lang+s[i].eng+s[i].phy+s[i].che+s[i].mat+s[i].csc;
}
for(int i=0;i<20;i++)
{
if(s[i].name[0] =='S')
{
cout<<"\n Name: " <<s[i].name;
cout<<"\n Total Mark: " <<s[i].total;
}
return 0;
}
```

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

- Data members are accessed by **dot(.) operator**.

Syntax: objectname.datamember;

- The syntax for that is using a dot (.) between the object name and the member name.

For example, the elements of the structure Student can be accessed as follows:

balu.rollno
balu.age

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

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

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

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

Explain in detail:

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

Coding:

```
#include<iostream>
using namespace std;
int main()
{
int i,j,a[10][10],b[10][10],m,n,diff[10][10];
cout<<"Enter the Number of Rows :";
cin>>m;
cout<<"Enter the Number of Columns :";
cin>>n;
cout<<"Enter the elements of A matrix \n";
for(i=0;i<m;i++)
for(j=0;j<n;j++)
cin>>a[i][j];
cout<<"Enter the elements of B matrix \n";
for(i=0;i<m;i++)
for(j=0;j<n;j++)
cin>>b[i][j];
cout<<"\nThe difference between the A & B Matrix is"<<endl;
for(i=0;i<m;i++)
{
for(j=0;j<n;j++)
{
diff[i][j]=a[i][j] – b[i][j];
cout<<diff[i][j]<<"\t";
}
cout<<"\n\n";
}
return 0;
}
```

Output:

```
Enter the Number of Rows : 2
Enter the Number of Columns: 2
Enter the elements of A matrix
5    6
7    8
Enter the elements of B matrix
3    4
5    2
The difference between the A & B Matrix is
2    2
```

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

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

Coding::

```
#include<iostream>
using namespace std;
struct Distance
{
int feet;
float inch;
} d1, d2, sum;
int main()
{
cout<<"Enter the 1st Distance in \n Feet : ";
cin>>d1.feet;
cout<<" Inch : ";
cin>>d1.inch;
cout<<"Enter the 2nd Distance in \n Inch : ";
cin>>d2.feet;
cout<<" Inch : ";
cin>>d2.inch;
sum.feet = d1.feet + d2.feet;
sum.inch = d1.inch + d2.inch;
if (sum.inch>12)
{
int extra = sum.inch/12;
sum.feet=sum.feet+extra;
sum.inch=sum.inch-(extra *12);
}
cout<<"Sum of the given Two Distance in "<<endl;
cout<<" Feet : "<<sum.feet<<endl;
cout<<" Inch : "<<sum.inch;
return 0;
}
```

Output:

```
Enter the 1st Distance in
Feet : 28
Inch : 5.4
Enter the 2nd Distance in
Feet : 12
Inch : 10.2
Sum of the given Two Distance in
Feet : 41
Inch : 3.6
```

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

Coding:

```
#include<iostream>
//#include<stdio>
#include <string.h>
//#include<conio>
using namespace std;
struct books
{
char name[20], author[20];
} a[50];
int main()
{
cout<< "Details of Book No "<<1<< "\n";
cout<< "-----------------------\n";
cout<< "Book Name :"<<strcpy(a[0].name,"Programming ")<<endl;
cout<< "\tBook 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 (int i = 0; i < 2; i++)
{
cout<< "\n " << i + 1 << "\t| " << a[i].name << "\t| " << a[i].author;
}
cout<< "\n================================================";
return 0;
}
```

Output:

```
Details of Book No 1
-----------------------
Book Name :Programming Book Author:Dromy
Details of Book No 2
-----------------------
Book Name : C++programming
Book Author : BjarneStroustrup
================================================
S.No | Book Name | author
================================================
1 | Programming | Dromy
2 | C++programming | BjarneStroustrup
================================================
```

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

```
#include <iostream>
#include <string>
using namespace std;
struct student
{
introll_no;
char name[10];
long phone_number;
};
int main(){
student p1 = {1,"Brown",123443},p2;
p2.roll_no = 2;
strcpy(p2.name ,"Sam");
p2.phone_number = 1234567822;
cout<< "First Student" <<endl;
cout<< "roll no : " << p1.roll_no <<endl<< "name : " << p1.name <<endl;
cout<< "phone no : " << p1.phone_number <<endl;
cout<< "Second Student" <<endl;
cout<< "roll no : " << p2.roll_no <<endl<< "name : " << p2.name <<endl;
cout<< "phone no : " << p2.phone_number <<endl;
return 0;
}
```

Output:

```
First Student
Roll no : 1
Name : Brown
Phone No. :123443
Second Student
Roll no : 2
Name : Sam
Phone No. :123456822
```

5. Debug the error in the following program.

Error Program	Correct 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
<<people.age;
}
}
LoadArray(PersonRecpeop)
for (int i = 0; i < 10; i++)
{
cout<< "Enter first name:";
cin<<peop[i].firstName;
cout<< "Enter last name:";
cin>>peop[i].lastName;
cout<< "Enter age: "; cin>> people[i].age;}
}
	#include <iostream.h>
	struct PersonRec
	{
	char lastName[10];
	char firstName[10];
	int age;
	};
	PersonRec PeopleArrayType[10];
	void LoadArray(PeopleRec peop[10]);
	void main()
	{
	PersonRec people[10];
	for (i = 0; i < 10; i++)
	{
	cout<<people[i].firstName<< " "
	<<people[i].lastName<<endl
	<<people[i].age;
	}
	}
	LoadArray(PersonRec peop[10])
	{
	for (int i = 0; i < 10; i++)
	{
	cout<< "Enter first name:";
	cin<<peop[i].firstName;
	cout<< "Enter last name:";
	cin>>peop[i].lastName;
	cout<< "Enter age: ";
	cin>> peop[i].age;
	}
	}

CHAPTER 13: Introduction to Object Oriented Programming Techniques

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

Very Short Answers:

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

Modular programming	Procedural programming
Emphasis on algorithm rather than data	Procedural programming aims more at procedures.
Programs are divided into individual modules	Programs are organized in the form of subroutines or sub programs.
Example: **Pascal** and **C**	Example: **FORTRAN** and **COBOL**.

2. **Differentiate classes and objects.**

Class	Object
Class is a user defined data type. Class represents a group of similar objects.	Objects are the basic unit of OOP. It represents data and associated function together in to a single unit.

3. **What is polymorphism?**
   - Polymorphism is the ability of a message or function to be displayed in more than one form.
4. **How is encapsulation and abstraction are interrelated?**

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

   Data Abstraction: Abstraction refers to showing only the essential features without revealing background details.
5. **Write the disadvantages of OOP.**
   - **Size:** Object Oriented Programs are much larger than other programs.
   - **Effort:** Object Oriented Programs require a lot of work to create.
   - **Speed:** Object Oriented Programs are slower than other programs, because of their size.

Short Answers:

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,
     - Procedural programming
     - Modular Programming
     - Object Oriented Programming
2. **Write a note on the features of procedural programming.**
   - Programs are organized in the form of subroutines or sub programs.
   - All data items are global.
   - Suitable for small sized software application.
   - Difficult to maintain and enhance the program code as any change in data type needs to be propagated to all subroutines that use the same data type. This is time consuming.

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.
4. **What do you mean by modularization and software reuse?**
   - **Modularisation:** where the program can be decomposed into **modules**.
   - **Software re-use:** where a program can be composed from existing and new modules.
5. **Define information hiding.**
   - The data is not accessible to the outside world, and only those functions which are wrapped in the class can access it.
   - This encapsulation of data from direct access by the program is called data hiding or information hiding.

Explain in detail:

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

Object Oriented Programming	Procedural programming
Emphasizes on data rather than algorithm	Procedural programming aims more at procedures.
It implements programs using **classes** and **objects.**	Programs are organized in the form of subroutines or sub programs.
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 subroutines that use the same data type.
Example: **C++, Java, VB.Net, Python etc.**	Example: **FORTRAN** and **COBOL**.

2. **What are the advantages of OOPs?**

   Advantages of OOP:
   - **Re-usability:** "Write once and use it multiple times" you can achieve this by using class.
   - **Redundancy:** Inheritance is the good feature for data redundancy. If you need a same functionality in multiple class you can write a common class for the same functionality and inherit that class to sub class.
   - **Easy Maintenance:** It is easy to maintain and modify existing code as new objects can be created with small differences to existing ones.
   - **Security:** Using data hiding and abstraction only necessary data will be provided thus maintains the security of data.

3. **Write a note on the basic concepts that supports OOPs?**

Main Features of Object Oriented Programming:

- **Encapsulation:** The mechanism by which the data and functions are bound together into a single unit is known as **Encapsulation**.
- **Data Abstraction:** Abstraction refers to showing only the essential features without revealing background details.
- **Modularity:** Modularity is designing a system that is divided into a set of functional units (named modules) that can be composed into a larger application.
- **Inheritance:** Inheritance is the technique of building new classes **(derived class)** from an existing Class **(base class)**.
- **Polymorphism:** Polymorphism is the ability of a message or function to be displayed in more than one form.

CHAPTER 14: Classes and objects

Choose the correct answer:

1. The variables declared inside the class are known as
   (A) data (B) inline (C) method (D) **attributes**
2. Which of the following statements about member functions are True or False?
   i) A member function can call another member function directly with using the dot operator.
   ii) Member function can access the private data of the class.
   (A) i)True, ii)True (B) **i)False, ii)True**
   (C) i)True, ii)False (D) i)False,ii)False
3. A member function can call another member function directly, without using the dot operator called as
   (A) sub function (B) sub member
   (C) **nesting of member function** (D) sibling of member function
4. The member function defined within the class behave like ..... 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

Very Short Answers:

1. **What are called members?**
   - Class comprises of members. Members are classified as Data Members and Member functions.
   - Data members are the data variables that represent the features or properties of a class. Data members are also called as attributes.
   - Member functions are the functions that perform specific tasks in a class. Member functions are called as methods.
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. To make use of a class, the variables of that class type have to be declared.	The class variables are called object. Objects are also called as instance of class.

4. **Why it is considered as a good practice to define a constructor though compiler can automatically generate a constructor?**
   - 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
     - To allocate memory space to the object and
     - 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 a object.

Short Answers:

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

Error Program	Corrected Program

#include<iostream>
#include<stdio.h>
class mystud
{
int studid =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( );
}
	#include<iostream>
	#include<stdio.h>
	using namespace std;
	class mystud
	{
	int studid;
	char name[20];
	public:
	mystud()
	{
	studud=1001;
	}
	void register ()
	{
	cin>>**studid;**
	gets(name);
	}
	void display ()
	{
	cout<<studid<<":"<<name<<endl;
	}
	};
	int main()
	{
	mystud MS;
	MS.register();
	MS.display();
	}

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

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

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

- Function 1 is called **Destructor**. (Class name starting with ~ symbol)
- It gets invoked when a class object goes out scope.

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).
- It gets invoked when a class object comes into scope.

3. **What are advantages of declaring constructors and destructor under public accessibility?**
   - Constructors and destructors are recommended to define under public accessibility. This is because an object can be created in any function and can also destroy the created object.
4. **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:

```
#include<iostream>
using namespace std;
class X
{
int n;
float avg;
public:
X(int p,float q)
{ n=p;
avg=q;
}
void disp()
{
cout<<"\n Roll numbe:- " <<n;
cout<<"\nAverage :- "<<avg;
}
};
int main()
{
int a ; float b;
cout<<"\nEnter the Roll Number: ";
cin>>a;
cout<<"\nEnter the Average: ";
cin>>b;
X x(a,b); // dynamic initialization
x.disp();
return 0;
}
```

Output :

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

Explain in detail:

1. Mention the differences between constructor and destructor.

Constructor	Destructor
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.
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.
Allocated memory space for the objects.	Destroy the object

2. Write the output of the following:

```
#include<iostream>
using namespace std;
class student
{
int rno, marks;
public:
student(int r,int m)
{ cout<<"Constructor "<<endl;
rno=r;
marks=m;
}
void printdet()
{
marks=marks+30;
cout<<"Name: Bharathi"<<endl;
cout<<"Roll no : "<<rno<<"\n";
cout<<"Marks : "<<marks<<endl;
}
};
int main()
{
student s(14,70);
s.printdet();
cout<< "Back to Main";
return 0;
}
```

Output:

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

CHAPTER 15: Polymorphism

Choose the correct answer:

1. Which of the following refers to a function having more than one distinct meaning?
   (A) **Function Overloading** (B) Member overloading
   (C) Operator overloading (D) Operations overloading
2. Which of the following reduces the number of comparisons in a program ?
   (A) Operator overloading (B) Operations overloading
   (C) **Function Overloading** (D) Member overloading
3. void dispchar(char ch='$',int size=10)
   {
   for(int i=1;i<=size;i++)
   cout<<ch;
   }
   How will you invoke the function dispchar() for the following input?
   To print $ for 10 times
   (A) **dispchar();** (B) dispchar(ch,size);
   (C) dispchar($,10); (D) dispchar('$',10 times);
4. Which of the following is not true with respect to function overloading?
   (A) The overloaded functions must differ in their signature.
   (B) **The return type is also considered for overloading a function**.
   (C) The default arguments of overloaded functions are not considered for Overloading.
   (D) Destructor function cannot be overloaded.
5. Which of the following is invalid prototype for function overloading.
   (A) Void fun (int x);
   Void fun (char ch) ;
   (B) **Void fun (int x);**
   Void fun (int y);
   (C) Void fun (double d);
   Void fun (char ch);
   (D) Void fun (double d);
   Void fun (int y);

Very Short Answers:

1. **What is function overloading?**
   - The ability of the function to process the message or data in more than one form is called as function overloading.
2. **List the operators that cannot be overloaded.**
   - Scope operator (**::**)
   - Sizeof
   - Member selector (**.**)
   - Member pointer selector (*****)
   - Ternary operator (**?:**)
3. **class add{int x; public: add(int)}; Write an outline definition for the constructor.**
   - **Outline definition for the constructor:**

```
add : : add(int a)
{
x = a ;
}
```

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.
     - Only arguments are considered.
5. **What is the use of overloading a function?**
   - Function overloading is not only implementing polymorphism but also reduces the number of comparisons in a program and makes the program to execute faster.
   - Program complexity is reduced.
   - It also helps the programmer by reducing the number of function names to be remembered.

Short Answers:

1. **What are the rules for function overloading?**
   - The overloaded function must differ in the number of its arguments or data types.
   - The return types 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. **What is operator overloading? Give some examples of operators which can be overloaded.**
   - The mechanism of giving special meaning to an operator is known as operator overloading.
   - The term Operator overloading, refers to giving additional functionality to the normal C++ operators like +,++,-,—,+=,-=,*.<,>.
3. **Discuss the benefits 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.

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

- When you call an overloaded function, the compiler determines the most appropriate definition to use, by comparing the argument types you have used to call the function with the parameter types specified in the definitions.

Example:

```
#include <iostream>
using namespace std;
void print(int i)
{cout<< " It is integer " << i <<endl;}
void print(double f)
{ cout<< " It is float " << f <<endl;}
void print(string c)
{ cout<< " It is string " << c <<endl;}
int main()
{
print(10);
print(10.10);
print("Ten");
return 0;
}
```

Output:
```
It is integer 10
It is float 10.1
It is string Ten
```

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

- **Non inline definition for constructor:**

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

Explain in detail:

1. What are the rules for operator overloading?

- Precedence and associatively 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 given 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.

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

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

- Constructor.

ii. Which concept is illustrated by Function 3? When is this function called/ invoked?

- Destructor. Executed automatically when object goes out of scope.

iii. What is the use of Function 3?

- It is destructor which removes the memory space of an object which was allocated by the constructor.

iv. Write the statements in main to invoke function1 and function 2

```
int main( )
{
Book b;                 // Function 1 invoke.
display(123.45);        // Function 2 invoke.
```

v. Write the definition for Function 4 .

```
Book(int SC, char s[ ], flot F)
{
BookCode=SC;
strcpy(Bookname,s);
fees=F;
```

3. **Write the output of the following program:**

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

Output:

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

4. Answer the questions based on the following program

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

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

- ob and ob1

ii. Name the object which gets destroyed in between the program.

- ob

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

- Operator overloaded is: = =
- Invoke the statement is: **ob = = ob1**

iv. Write out the prototype of the overloaded member function.

- void comp :: operator = = (comp ob)

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

- User defined

vi. Which constructor will get executed in the above program? Write the output of the program.

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

Output:

```
Enter First String: Mani
Enter Second String: Mani
Strings are Equal
```

CHAPTER 16: Inheritance

Choose the correct answer:

1. Which of the following is the process of creating new classes from an existing class
   (a) Polymorphism (b) **Inheritance** (c) Encapsulation (d) super class
2. Which of the following derives a class student from the base class school
   (a) school: student (b) **class student : public school**
   (c) student : public school (d) class school : public student
3. The type of inheritance that reflects the transitive nature is
   (A) Single Inheritance (B) Multiple Inheritance
   (C) **Multilevel Inheritance** (D) Hybrid Inheritance
4. Which visibility mode should be used when you want the features of the base class to be available to the derived class but not to the classes that are derived from the derived class?
   (A) **Private** (B) Public (C) Protected (D) All of these
5. Inheritance is a 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 to 9.4)

```
class vehicle
{ int wheels;
public:
void input_data(float,float);
void output_data();
protected:
int passenger;
};
class heavy_vehicle : protected
vehicle {
int diesel_petrol;
protected:
int load;
public:
void read_data(float,float)
void write_data(); };
class bus: private heavy_vehicle {
char Ticket[20];
public:
void fetch_data(char);
void display_data(); };
```

9.1. Which is the base class of the class heavy_vehicle?
(a) Bus (b) heavy_vehicle (c) **vehicle** (d) both (a) and (c)

9.2. The data member that can be accessed from the function displaydata()
(a) passenger (b) load (c) Ticket (d) **All of these**

9.3. The member function that can be accessed by an objects of bus Class is
(a) input_data(), output_data() (b) read_data() ,write_data()
(c) **fetch_data(), display_data()** (d) All of these

9.4. The member function that is inherited as public by Class Bus
(a) input_data(), output_data() (b) read_data(), write_data()
(c) **fetch_data(), display_data()** (d) none of these

Very Short Answers:

1. **What is inheritance?**
   - The mechanism of deriving new class from an existing class is called inheritance.
2. **What is a base class?**
   - A class that is used as the basis for creating a new class is called a superclass 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 contains many base class?**
   - **Multiple Inheritance :** When a derived class inherits from multiple base classes it is known as multiple inheritance.
   - **Multilevel Inheritance :** When a class is derived from a class which is a derived class – then it is referred to as multilevel inheritance.
5. **What is the difference between public and private visibility mode?**

public visibility mode	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.	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.

Short Answers:

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

The following points should be observed for defining the derived class.

- The keyword class has to be used.
- The name of the derived class is to be given after the keyword class.
- A single colon (:).
- 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.
- The name of the base class(parent class), if more than one base class, then it can be given separated by comma.

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

Private visibility members	public visibility members
It can be accessed within the class.	It can be accessed outside the class also with its object.
By default, the members will be in private visibility mode.	Members, to be in public visibility mode have to be specified explicitly.
The private members of the base class are not inherited; they are only visible and cannot be accessed.	When classes are inherited, the public members are inherited as private, protected and public members of the derived calss.

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

Polymorphism	Inheritance
Polymorphism is the ability of a message or function to be displayed in more than one form.	**Inheritance** is a process of creating new classes called derived classes, from the existing or base classes.
Polymorphism implemented only on functions / methods.	Inheritance implemented only in classes.
Reduces the software complexity.	Promotes code sharing and reduces development cost.

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

- When a derived class member function has the same name as that of its base class member function, the derived class member function shadows/hides the base class's inherited function .This situation is called function overriding.

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

- When an object of the derived class is created, the compiler first calls the base class **constructor** and then the constructor of the derived class. This is because the derived class is built up on the members of the base class.
- When the object of a derived class expires first the derived class destructor is invoked followed by the base class **destructor.**

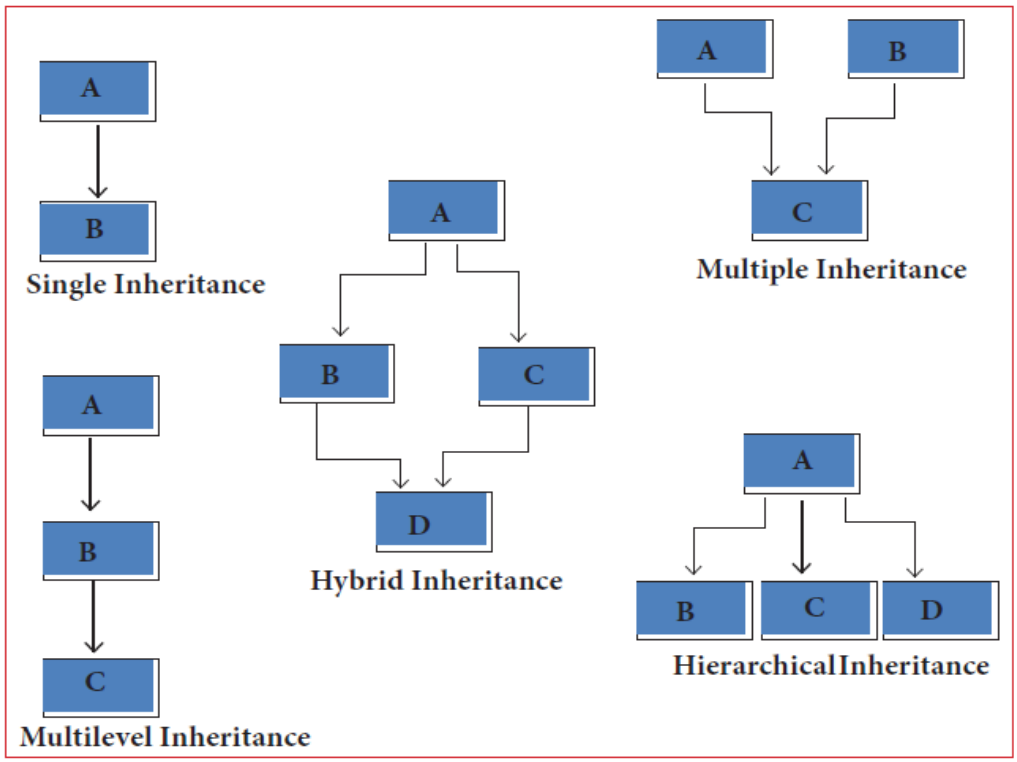
Explain in detail:

1. **Explain the different types of inheritance.**

There are different types of inheritance viz., Single Inheritance, Multiple inheritance, Multilevel inheritance, hybrid inheritance and hierarchical inheritance.

- **Single Inheritance:** When a derived class inherits only from one base class, it is known as single inheritance.
- **Multiple Inheritance**: When a derived class inherits from multiple base classes it is known as multiple inheritance.
- **Hierarchical inheritance**: When more than one derived classes are created from a single base class , it is known as Hierarchical inheritance.
- **Multilevel Inheritance**: The transitive nature of inheritance is 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.
- **Hybrid inheritance**: When there is a combination of more than one type of inheritance, it is known as hybrid inheritance.

The following diagram represents the different types of inheritance

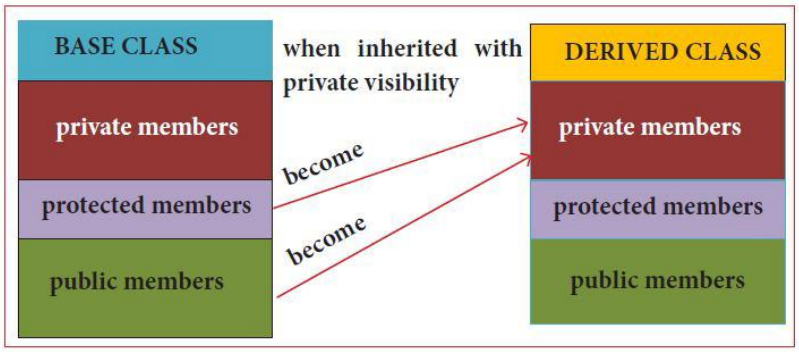


2. Explain the different visibility mode through pictorial representation.

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

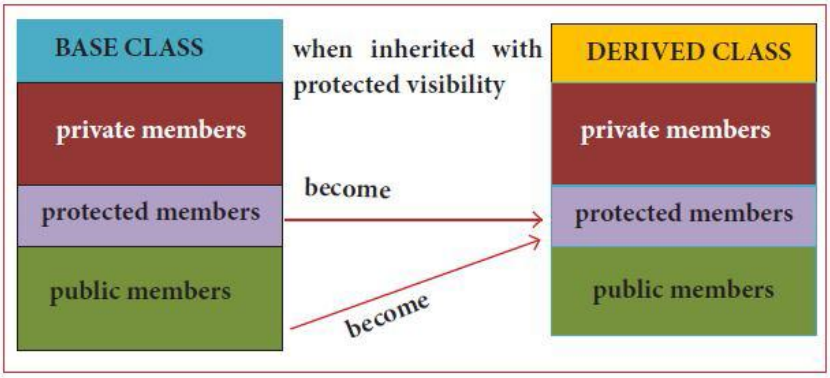
Private visibility mode:

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



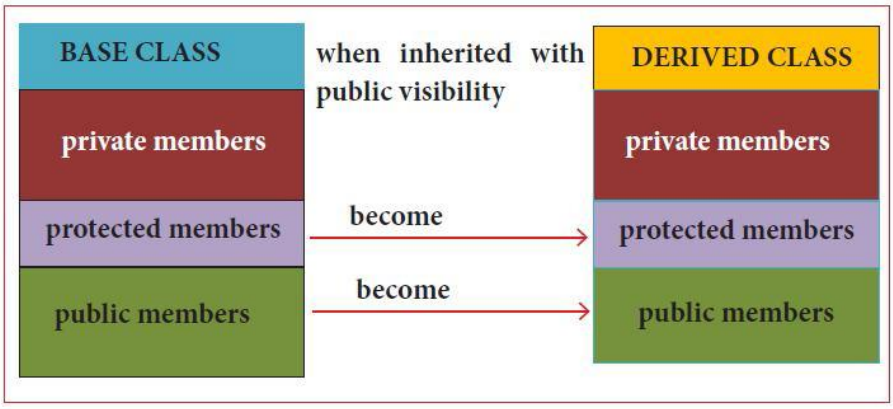
protected visibility mode:

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



public visibility mode:

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



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

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

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

- Multilevel Inheritance

ii. Specify the visibility mode of base classes.

- Private visibility - Marks class
- Public visibility - Result class

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

- **Constructor**: personal(), Marks(), Result()
- **Destructor**: Result(), Marks(), personal()

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

- Base classes : Personal & Marks
- Derived classes : Marks & Result

v. Give number of bytes to be occupied by the object of the following class:
(a) Personal (b) Marks (c) Result

(a) Personal : 29 Byte
(b) Marks: 54 Byte
(c) Result: 83 Byte

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

- FinalGrade, Commerce

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

- Rcalculate( ), Rdisplay( ) - Result class members
- Mentry( ), Mdisplay( ) - Derived class members

viii. 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.

```
#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->y = y;
}
B()
{
cout<<endl<<" I am class B "<<endl;
}
~B()
{
}
```

```
void show()
{
cout<<"x = "<<x<<endl;
cout<<"y = "<<y<<endl;
}
};
int main()
{
A objA;
B objB(30, 20);
objB.show();
return 0;
}
```

Output:

I am Class A
I am Class A
x = 30
y = 30
Bye
Bye
Bye
Bye

5. Debug the following program:

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

LINE NO	ERROR STATEMENT	CORRECTED STATEMENT	DESCRIPTION
2	%include(iostream.h)	#include<iostream.h>	Header file should start with #
3	Class A	class A	Keyword class should be in lower case
5	public;	public:	Access Specifier should contain : (Colon)
6	int a1,a2:a3;	int a1,a2,a3;	Every variable should be separated by comma
7	Void getdata[]	void getdata()	Keyword should be in lower case. Function contain ( )
13	Class B:: public A()	class b::public A()	Keyword should be in lower case.
13	Class B:: public A()	class b:public A()	Inheritance symbol is : (colon)
13	Class B:: public A()	class b:public A	Class A should not contain ( )
15	PUBLIC	public:	Access Specifier should contain : (Colon)
16	voidfunc()	void func()	Space should be allowed
18	int b1:b2:b3;	int b1,b2,b3;	Every variable should be separated by comma
19	A::getdata[];	void A::getdata()	Data type is missing
22	a3=a3;	b3=a3;	Wrong Assignment
27	clrscr()	clrscr();	Every statement should be terminated
29	der1:func();	der.func();	Object name is wrong. Dot operator is used to access the member function

CHAPTER 17: Computer Ethics And Cyber Security

Choose the correct answer:

1. Which of the following deals with procedures, practices and values?
   (a) piracy (b) programs (c) virus (d) **computer ethics**
2. Commercial programs made available to the public illegally are known as
   (a) freeware (b) **warez** (c) free software (d) software
3. Which one of the following are self-repeating and do not require a computer program to attach themselves?
   (a) viruses (b) **worms** (c) spyware (d) Trojans
4. Which one of the following tracks a user visits a website?
   (a) spyware (b) **cookies** (c) worms (d) Trojans
5. Which of the following is not a malicious program on computer systems?
   (a) worms (d) 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

Very Short Answers:

1. **What is harvesting?**
   - A person or program collects login and password information from a legitimate user to illegally gain access to others' account(s).
2. **What are Warez?**
   - Commercial programs that are made available to the public illegally are often called warez.
3. **Write a short note on cracking.**
   - Cracking is where someone edits a program source so that the code can be exploited or modified.
4. **Write two types of cyber attacks.**
   - Virus * Worms * Spyware * Ransomware
   - Pharming * Phishing * Man In The Middle (MITM)
5. **What is a Cookie?**
   - A cookie is a small piece of data sent from a website and stored on the user's computer memory (Hard drive) by the user's web browser while the user is browsing internet.

Short Answers:

1. **What is the role of firewalls?**
   - A firewall is a computer network security based system that monitors and controls incoming and outgoing network traffic based on predefined security rules.
   - A firewall commonly establishes a block between a trusted internal computer network and entrusted computer outside the network.
2. **Write about encryption and decryption.**
   - Encryption and decryption are processes that ensure confidentiality that only authorized persons can access the information.
   - Encryption is the process of translating the plain text data (plaintext) into random and mangled data (called cipher-text).
   - Decryption is the reverse process of converting the cipher-text back to plaintext. Encryption and decryption are done by cryptography.
3. **Explain about proxy server.**
   - A proxy server acts as an intermediary between the end users and a web server.
   - A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resources available from a different server.
   - The proxy server examines the request, checks authenticity and grants the request based on that.
   - Proxy servers typically keep the frequently visited site addresses in its cache which leads to improved response time.
4. **What are the guidelines to be followed by any computer user?**
   - **Honesty:** Users should be truthful while using the internet.
   - **Confidentiality:** Users should not share any important information with unauthorized people.
   - **Respect:** Each user should respect the privacy of other users.
   - **Professionalism:** Each user should maintain professional conduct.
   - **Obey The Law:** Users should strictly obey the cyber law in computer usage.
   - **Responsibility:** Each user should take ownership and responsibility for their actions.

5. What are ethical issues? Name some.

- An Ethical issue is a problem or issue that requires a person or organization to choose between alternatives that must be evaluated as right (ethical) or wrong (unethical).
  Some of the common ethical issues are listed below:
  - Cyber crime
  - Software Piracy
  - Unauthorized Access
  - Hacking
  - Use of computers to commit fraud
  - Sabotage in the form of viruses
  - Making false claims using computers

Explain in detail:

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	Malicious programs that can perform a variety of functions including stealing, encrypting or deleting sensitive data, altering or hijacking core computing functions and monitoring user's computer activity without their permission.
Harvesting	A person or program collects login and password information from a legitimate user to illegally gain access to others' account(s).
Spam	Distribute unwanted e-mail to a large number ofinternet users.
Spoofing	It is a malicious practice in which communication is send from unknown

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.
- In simple words, Software Piracy is "unauthorized copying of software".
  Types of Privacy:
  - Duplicating and selling copyrighted programs.
  - Downloading software illegally through network.
- 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.
- To prevent unauthorized access, Firewalls, **Intrusion Detection Systems** (IDS), Virus and Content Scanners, Patches and Hot fixes are used.

3. Write the different types of cyber attacks.

- **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.
- **Worms:** Worms are self – repeating and do not require a computer program to attach themselves.
- **Spyware**: Spyware can be installed on the computer automatically when the attachments are open, by clicking on links or by downloading infected software.
- **Ransomeware:** Ransomware is a type of malicious program that demands payment after launching a cyper-attack on a computer system.
- **Pharming** : Pharming is a scamming practice in which malicious code is installed on a personal computer or server, misdirecting users to fraudulent web sites without their knowledge or permission.
- **Phishing:** Phishing is a type of computer crime used to attack, steal user data, including login name, password and credit card numbers.
- **Man In The Middle (MITM):** Man-in-the-middle attack is an attack where the attacker secretly relays and possibly alters the communication between two parties who believe they are directly communicating with each other.

CHAPTER 18: Tamil Computing

Very Short Answers:

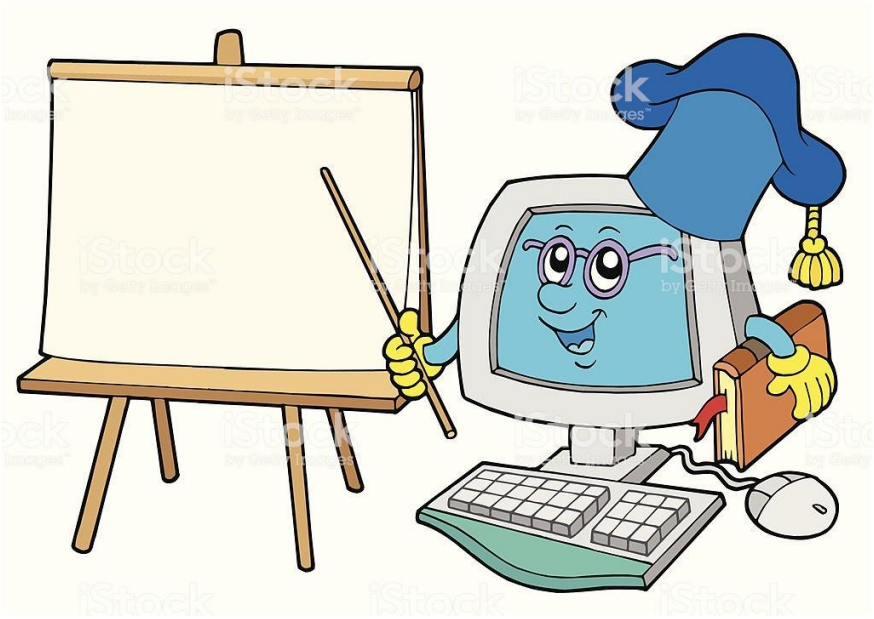
1. **List the search engines supported by Tamil language.**
   - Google and Bing
2. **What are the keyboard layouts used in Android?**
   - Sellinam and Ponmadal – are familiar Tamil keyboard layouts that works on Android operating system.
3. **Write a short note about Tamil Programming Language.**
   - Based on Python programming language, the first Tamil programming language "Ezhil" 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) 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.
   - Now, this organisation functioning with the name "Tamil Virtual Academy".
   - This organization offers different courses regarding Tamil language, Culture, heritage etc., from kindergarten to under graduation level.

HIGHER SECONDARY FIRST YEAR

COMPUTER SCIENCE

PRACTICAL PROGRAMS WITH SOLUTIONS

2025 - 26



HIGHER SECONDARY FIRST YEAR - COMPUTER SCIENCE

PRACTICAL PROGRAMS

INDEX

CS1 - GROSS SALARY

1. **Write a C++ program to input basic salary of an employee and calculate its Gross salary according to following:**

Basic Salary <25000	**HRA = 20%**	**DA = 80%**
Basic Salary >= 25000	**HRA = 25%**	**DA = 90%**
Basic Salary >= 40000	**HRA = 30%**	**DA = 95%**

Aim: To write a C++ program for input basic salary of an employee and calculating its Gross salary.

Coding:

```
#include<iostream>
#include<iomanip>
using namespace std;
int main()
{
float basic,gross,da,hra;
cout<<"Enter Basic salary of an employee:";
cin>>basic;
if(basic<25000)
{
        da=basic*80/100;
        hra=basic*20/100;
}
else if (basic>=25000&&basic<40000)
{
        da=basic*90/100;
        hra=basic*25/100;
}
else if (basic>=40000)
{
        da=basic*95/100;
        hra=basic*30/100;
}
gross=basic+hra+da;
cout<<setw(25)<<"Basic pay:"<<setw(10)<<basic<<endl;
cout<<setw(25)<<"Dearness allowance:"<<setw(10)<<da<<endl;
cout<<setw(25)<<"House rent allowance:"<<setw(10)<<hra<<endl;
cout<<setw(25)<<" "<<setw(10)<<"....."<<endl;
cout<<setw(25)<<"Gross salary:"<<setw(10)<<gross<<endl;
cout<<setw(25)<<" "<<setw(10)<<"....."<<endl;
return 0;
}
```

Output :

```
Enter Basic salary of an employee :  25000
                Basic Pay:          25000
  Dearness Allowance:               22500
House Rent Allowance:                6250
                                  .....
              Gross Salary:         53750
                                  .....
```

Result: Thus, the program for calculating Gross Salary has been created and executed successfully.

CS2 - PERCENTAGE

2. **Write a C++ program to check percentage of a student and display the division (distinction, first, second, third or fail) scored using switch case**

Percentage	Division
>=80	Distinction
>=60 and <80	First division
>=50 and <60	Second Division
>=40 and <50	Third Division
<40	Fail

Aim: To write a C++ program for checking percentage of a student and display the division (distinction, first, second, third or fail) scored using switch case.

Coding:

```
#include<iostream>
using namespace std;
int main()
{
float percent;
int x;
cout<<"Enter your percentage : ";
cin>>percent;
cout<<" You scored  : "<<percent<<"%"<<endl;
x=percent/10;
switch(x)
{
case 10:
case 9:
case 8:
cout<<"You have passed with Distinction";
break;
case 7:
case 6:
cout<<"You have passed with First Division";
break;
case 5:
cout<<"You have passed with Second Division";
break;
case 4:
cout<<"You have passed with Third Division";
break;
default:
cout<<" Sorry : You have Failed ";
}
return 0;
}
```

Output 1 :
```
Enter your percentage : 79
You scored : 79%
You have passed with First Division
```

Output 2 :
```
Enter your percentage : 39
You scored : 39%
Sorry : You have Failed
```

Result: Thus, the program for finding percentage of student has been created and executed successfully.

CS3 – PALINDROME

3. **Write a C++ program to enter any number and check whether the number is palindrome or not using while loop.**

Aim:

To write a C++ program for entering any number and checking whether the number is palindrome or not using while loop

Coding:

```
#include<iostream>
using namespace std;
int main()
{
int num,n,digit,rev=0;
cout<<"Enter the positive number:";
cin>>num;
n=num;
while(num)
{
digit=num%10;
rev=(rev*10)+digit;
num=num/10;
}
cout<<"The reverse of the number is:"<<rev<<endl;
if(n==rev)
cout<<"The number is a Palindrome";
else
cout<<"The number is not a Palindrome";
return 0;
}
```

Output 1 :

```
Enter the positive number: 1221
The reverse of the number is: 1221
The number is a Palindrome
```

Output 2 :

```
Enter the positive number: 1234
The reverse of the number is: 4321
The number is not a Palindrome
```

Result:

Thus, the program for checking a number is Palindrome or not has been created and executed successfully.

CS4 - NUMBER CONVERSION

4. Using do while loop create the following menu based C++ program

1.Convert a Decimal to binary number

2.Convert a binary number to Decimal 3. Exit

Depending on the choice accept the value and display the result .The program should continue till the user select the third option.

Aim:

To create a C++ program for number conversion using do while loop

Coding:

```
#include<iostream>
using namespace std;
#include<cmath>
int main()
{
int dec,d,i,temp,ch;
long int bin;
do
{
dec=bin=d=i=0;
cout<<"\n\n\t\t MENU \n 1. DECIMAL TO BINARY NUMBER\n 2.
BINARY TO DECIMAL NUMBER\n  3. EXIT\n";
cout<<"Enter your choice(1/2/3)";
cin>>ch;
switch(ch)
{
case 1: cout<<"Enter the Decimal Number :";
cin>>dec;
temp=dec;
while(dec!=0)
{
d=dec%2;
bin+=d*pow(10,i);
dec/=2;
i++;
}
cout<<"The Binary Number is:"<<bin; break;
case 2:
cout<<"Enter the Binary Number :";
cin>>bin;
temp=bin;
while(bin!=0)
{
d=bin%10;
dec+=d*pow(2,i);
bin/=10;
i++;
}
cout<<"The Decimal Number is:"<<dec; break;
case 3: break;
default: cout<<"Invalid Choice:";
}
}
while(ch!=3);
return 0;
}
```

Output 1 : MENU

1. DECIMAL TO BINARY NUMBER
2.BINARY TO DECIMAL NUMBER
3.EXIT
Enter Your Choice(1/2/3) 1
Enter the Decimal Number : 23
The Binary Number is: 10111

Output 2 : MENU

1. DECIMAL TO BINARY NUMBER
2.BINARY TO DECIMAL NUMBER
3.EXIT
Enter Your Choice (1/2/3) 2
Enter the Binary Number : 11001
The Decimal Number is: 25

Output 3 : MENU

1. DECIMAL TO BINARY NUMBER
2.BINARY TO DECIMAL NUMBER
3.EXIT
Enter Your Choice (1/2/3) 3

Output 4 : MENU

1. DECIMAL TO BINARY NUMBER
2.BINARY TO DECIMAL NUMBER
3.EXIT
Enter Your Choice (1/2/3) 4
Invalid Choice

Result:

Thus, the program Number Conversion has been created and executed successfully.

CS5 - FIBONACCI PRIME SERIES

5. Write a C++ program using a user defined function to generate the Fibonacci series till n terms and print if each term is prime or Composite.

Aim:

To write a C++ program using a user defined function for generating the Fibonacci series till n terms and print if each term is prime or composite.

Coding:

```
#include<iostream>
#include<stdlib.h>
using namespace std;
void Primechk(int a)
{
int j;
if(a==0||a==1)
{
cout<<"\tNEITHER PRIME NOR COMPOSITE";
} else
{
for(j=2;j<a;j++)
{
if(a%j==0)
{
cout<<"\tCOMPOSITE"; break;
}
} if(a==j)
cout<<"\tPRIME";
}
}
void fibo (int n)
{
int a = -1,b=1,c=0;
for (int i=1;i<=n;i++)
{
cout<<endl;
c=a+b;
cout<<c;
Primechk(c);
a=b;
b=c;
}
}
int main()
{
int n;
cout<<"ENTER THE NUMBER OF REQUIRED FIBO TERMS...";
cin>>n;
cout<<"\n\t FIBONACCI SERIES\n";
fibo (n);
return 0;
}
```

Output:

```
ENTER THE NUMBER OF REQUIRED FIBO TERMS...10

        FIBONACCI SERIES

0       NEITHER PRIME NOR COMPOSITE
1       NEITHER PRIME NOR COMPOSITE
1       NEITHER PRIME NOR COMPOSITE
2       PRIME
3       PRIME
5       PRIME
8       COMPOSITE
13      PRIME
21      COMPOSITE
34      COMPOSITE
```

Result:

Thus, the program Fibonacci Prime Series has been created and executed successfully.

CS6 - INSERT / DELETE ELEMENTS IN AN ARRAY

6. Write a menu driven C++ program to Insert and Delete elements in a single dimension array of integers and print the array after insertion or deletion.

Aim:

To write a menu driven C++ program for Inserting and Deleting elements in a single dimension array of integers and print the array after insertion or deletion.

Coding:

```
#include<iostream>
using namespace std;
int a[20],b[20],c[40];
int m,n,p,val,i,j,key,pos,temp;
/*Function Prototype*/
void display();
void insert();
void del();
int main()
{
int choice;
cout<<"\nEnter the size of the array elements:\t";
cin>>n;
cout<<"\nEnter the elements for the array:\n";
for (i=0;i<n;i++)
{
cin>>a[i];
}
do {
cout<<"\n\n--------Menu----------\n";
cout<<"1.Insert\n";
cout<<"2.Delete\n";
cout<<"3.Exit\n";
cout<<"----------------------";
cout<<"\nEnter your choice:\t";
cin>>choice;
switch (choice)
{
case 1: insert(); break;
case 2: del(); break;
case 3:break;
default :cout<<"\nInvalid choice:\n";
}
} while (choice!=3);
return 0;
}
void display()//displaying an array elements
{
int i;
cout<<"\nThe array elements are:\n";
for(i=0;i<n;i++)
{
cout<<a[i]<<" ";
}
```

```
}//end of display()
void insert()//inserting an element in to an array
{
cout<<"\nEnter the position for the new element:\t";
cin>>pos;
cout<<"\nEnter the element to be inserted :\t";
cin>>val;
for (i=n; i>=pos-1; i--)
{
a[i+1]=a[i];
}
a[pos-1]=val;
n=n+1;
display();
}//end of insert()
void del()//deleting an array element
{
cout<<"\n Enter the position of the element to be deleted:\t";
cin>> pos;
val= a [pos];
for (i= pos;i<n-1;i++)
{
a[i]=a[i+1];
}
n=n-1;
cout<<"\nThe deleted element is = "<<val;
display();
}//end of delete()
```

Output:

```
Enter the size of the array elements: 5
Enter the elements for the array:
1
2
3
4
5
--------Menu----------
1.Insert
2.Delete
3.Exit
----------------------
Enter your choice: 1
Enter the position for the new element: 3
Enter the element to be inserted : 26
The array elements are:
1 2 26 3 4 5
--------Menu----------
1.Insert
2.Delete
3.Exit
----------------------
Enter your choice: 2
Enter the position of the element to be deleted: 2
The deleted element is = 2
The array elements are:
1 3 26 4 5
--------Menu----------
1.Insert
2.Delete
3.Exit
----------------------
Enter your choice: 3
--------------------------------
```

Result:

Thus, the program Insert or Delete elements in an array has been created and executed successfully.

CS 7 - Boundary Element of a Matrix

7. Write a C++ program to print boundary elements of a matrix

Aim:

To write a C++ program for printing boundary elements of a matrix.

Coding:

```
#include <iostream>
using namespace std;
void printBoundary (int a[][10], int m, int n)
{
for (int i = 0; i < m; i++) {
for (int j = 0; j < n; j++)
{
if (i==0|| j==0||i==m-1||j==n-1)
cout<<a[i][j]<<" ";
else
cout<<" ";
}
cout <<endl ;
}
}
// Driver code
int main()
{
int a[10][10] ,i,j,m,n;
cout<<"Enter more than 3 number of rows and columns"<<endl;
cin>>m>>n;
for (i=0;i<m;i++)
{
for (j=0;j<n;j++)
{
cout<<"enter the value for array["<<i+1<<"]"<<"["<<j+1<<"] :";
cin>>a[i][j];
}
}
system("cls");
cout<<"\n\nOriginal Array\n";
for (i=0;i<m;i++)
{
for (j=0;j<n;j++)
{
cout<<a[i][j]<<" ";
}
cout<<endl;
}
cout<<"\n\n The Boundry element\n";
printBoundary(a, m, n);
return 0;
}
```

Output:

```
Enter more than 3 number of rows and columns
4 4
enter the value for array[1][1] :1
enter the value for array[1][2] :2
enter the value for array[1][3] :3
enter the value for array[1][4] :4
enter the value for array[2][1] :5
enter the value for array[2][2] :6
enter the value for array[2][3] :7
enter the value for array[2][4] :8
enter the value for array[3][1] :9
enter the value for array[3][2] :0
enter the value for array[3][3] :1
enter the value for array[3][4] :2
enter the value for array[4][1] :3
enter the value for array[4][2] :4
enter the value for array[4][3] :5
enter the value for array[4][4] :6
Original Array
1 2 3 4
5 6 7 8
9 0 1 2
3 4 5 6
The Boundary element
1 2 3 4
5       8
9       2
3 4 5 6
```

Result:

Thus, the program Boundary element of a matrix has been created and executed successfully.

CS8 - ABC PUBLISHERS

8. **Define a class named Publisher in C++ with the following descriptions**

private members

Bookno integer
Title 20 characters
Author 10 characters
price float
Totamt float

Define a member function called calculate() to calculate the number of copies and the price and return the total amount.

Public members

A default constructor function to initialize all data members.The book number must be automatically generated staring from 1001

Readdata() function to accept values for Title,Author and price.Get the number of copies from the user and invoke calculate().

Display data () function display all the data members in the following format

ABC PUBLISHERS
~~~~~~~~~~~~~~~~~~

INVOICE
~~~~~~~~~

==========

Book Number :
Title :
Author Name :
Price Per Book :
Total Amount :

==========.

Aim: To write a program for defining a class named Publisher.

Coding:

```
#include<iostream>
#include<stdlib.h>
using namespace std;
int id=1001;
class Publisher
{
int Bookno;
char Title[20];
char Author [10];
float Price;
float Totamt;
float calculate (int);
public:
Publisher()
{Bookno=id;
Title[0]='\0';
Author[0]='\0';
Price=0;
Totamt=0;
id++;
}
```

```
void Readdata();
void Displaydata();
};
void Publisher::Readdata()
{
int nocopies;
cout<<"\nEnter the Title name ";cin>>Title;
cout<<"\nEnter the Author name ";cin>>Author;
cout<<"\nEnter the Price ";cin>>Price;
cout<<"\nEnter the Number of copies ";cin>>nocopies;
Totamt=calculate(nocopies);
}
float Publisher::calculate(int x)
{
return x*Price;
}
void Publisher::Displaydata()
{
cout<<"\n\t\tABC PUBLISHERS\n";
cout<<"\t\t~~~~~~~~~~~~~~\n";
cout<<"\t\t INVOICE\n";
cout<<"\t\t ~~~~~~~\n";
cout<<"\n=================================\n";
cout<<" Book Number : "<<Bookno<<endl;
cout<<"Title : "<<Title<<endl;
cout<<"Author Name : "<<Author<<endl;
cout<<"Price Per Book : "<<Price<<endl;
cout<<"Total Amount : "<<Totamt<<endl;
cout<<"\n=================================\n";
}
int main()
{
int n,i;
Publisher p[10];
cout<<"Enter the number of object to be created";cin>>n;
for (i=0;i<n;i++)
p[i].Readdata();
for (i=0;i<n;i++)
p[i].Displaydata();
return 0;
}
```

Output:

```
Enter the number of object to be created2
Enter the Title name C++Programming
Enter the Author name Balaguru
Enter the Price 500
Enter the Number of copies 3
Enter the Title name CoreJava
Enter the Author name Xavier
Enter the Price 250
Enter the Number of copies 5
ABC PUBLISHERS
~~~~~~~~~~~~~~~
INVOICE
~~~~~~~~
==================================
Book Number : 1001
Title : C++Programming
Author Name : Balaguru
Price Per Book : 500
Total Amount : 1500
==================================
ABC PUBLISHERS
~~~~~~~~~~~~~~~
INVOICE
~~~~~~~~
==================================
Book Number : 1002
Title : CoreJava
Author Name : Xavier
Price Per Book : 250
Total Amount : 1250
==================================
```

Result:

Thus, the program ABC Publishers has been created and executed successfully.

CS9 - EMPLOYEE DETAILS USING CLASS

9. **Create a C++ program to create a class employee contains the following members in public.**

Public members

eno integer
name 20 characters
des 20 characters

member Function

void get() to accept values for all data members

Declare the derived class called Salary which contain the following details.

Public members

bp, hra, da, pf, np float

member Function

void get1() to accept values for bp,hra,da and pf and invoke calculate()

calculate() calculate the np by adding bp,hra,da subtracting pf

display() Display all the details

Create the derived class object and read the number of employees.Call the function get(),get1() for each employee and display the details.

Aim:

To write a C++ Program for creating a class employee containing their details

Coding:

```
#include<iostream>
using namespace std;
class emp
{
public:
int eno;
char name[20], des[20];
void get()
{
cout<<"Enter the employee number:";
cin>>eno;
cout<<"Enter the employee name:";
cin>>name;
cout<<"Enter the designation:";
cin>>des;
}
};
class salary :public emp
{
float bp,hra, da,pf,np;
public:
void get1()
{
cout<<"Enter the basic pay:";
cin>>bp;
cout<<"Enter the HouseRent Allowance:";
cin>>hra;
cout<<"Enter the Dearness Allowance :";
cin>>da;
```

```
cout<<"Enter the Provident Fund:";
cin>>pf;
}
void calculate()
{
np=bp+hra+da-pf;
}
void display()
{
cout<<eno<<"\t"<<name<<"\t"<<des<<"\t"<<bp<<"\t"<<hra<<"\t"<<d
a<<"\t"<<pf<<"\t"<<np<<"\n";
}
};
int main()
{
int i, n;
char ch;
salary s[10];
cout<<"Enter the number of employee:";
cin>>n;
for (i =0; i < n; i++)
{
s[i].get();
s[i].get1();
s[i].calculate();
}
cout<<"\n\t\t\tEmployee Details\n";
cout<<"\ne_no \t e_name\t des \t bp \t hra \t da \t pf \t np \n";
for (i =0; i < n; i++)
{
s[i].display();
}
return 0;
}
```

Output:

```
Enter the number of employee:2
Enter the employee number:1201
Enter the employee name:Ramkumar
Enter the designation:Engineer
Enter the basic pay:50000
Enter the House Rent Allowance:10000
Enter the Dearness Allowance :5000
Enter the Provident Fund:1000
Enter the employee number:1202
Enter the employee name:Viswanathan
Enter the designation:Engineer-Tech
Enter the basic pay:40000
Enter the House Rent Allowance:9000
Enter the Dearness Allowance :4500
Enter the Provident Fund:1000
Employee Details
```

e_no	e_name	des	bp	hra	da	pf	np
1201	Ramkumar	Engineer	50000	10000	5000	1000	64000
1202	Viswanathan	Engineer-Tech	40000	9000	4500	1000	52500

Result:

Thus, the program Employee Details Using Class has been created and executed successfully.

CS10 -STUDENT DETAILS

10. **Write a C++ program to create a class called Student with the following details**

Protected member

Rno integer

Public members

void Readno(int); to accept roll number and assign to Rno

void Writeno(); To display Rno.

The class Test is derived Publically from the Student class contains the following details

Protected member

Mark1 float

Mark2 float

Public members

void Readmark(float,float); To accept mark1 and mark2

void Writemark(); To display the marks

Create a class called Sports with the following detail

Protected members

score integer

Public members

void Readscore(int); To accept the score

void Writescore(); To display the score

The class Result is derived Publically from Test and Sports class contains the following details

Private member

Total float

Public member

void display() assign the sum of mark1 ,mark2,score in total.

invokeWriteno(),Writemark() and Writescore() .Display the total also.

Aim:

To write a C++ program for creating a class called Student their details

Coding:

```
#include<iostream>
using namespace std;
class Student
{
protected:
int Rno;
public:
void Readno(int r)
{
Rno=r;
}
void Writeno()
{
cout<<"\nRoll no : "<<Rno;
}
};
class Test :public Student
{
```

```
protected:
float Mark1,Mark2;
public:
void Readmark (float m1,float m2)
{
Mark1=m1;
Mark2=m2;
}
void Writemark()
{
cout<<"\n\n\tMarks Obtained\n ";
cout<<"\n Mark1 : "<<Mark1;
cout<<"\n Mark2 : "<<Mark2;
}
};
class Sports
{
protected:
int score;// score = Sports mark
public:
void Readscore (int s)
{
score=s;
}
void Writescore()
{
cout<<"\n Sports Score : "<<score;
}
};
class Result :public Test,public Sports
{
int Total;
public:
void display()
{
Total = Mark1 + Mark2 + score;
Writeno();
Writemark();
Writescore();
cout<<"\n\n Total Marks Obtained : "<< Total<<endl;
}
};
int main()
{
Result stud1;
stud1.Readno(1201);
stud1.Readmark(93.5,95);
stud1.Readscore(80);
cout<<"\n\t\t\t HYBRID INHERITANCE PROGRAM\n";
stud1.display();
return 0;
}
```

Output:

```
        HYBRID INHERITANCE PROGRAM
Roll no : 1201
        Marks Obtained
Mark1                   : 93.5
Mark2                   : 95
Sports Score                    : 80
Total Marks Obtained            : 268
```

Result:

Thus, the program Student Details has been created and executed successfully.

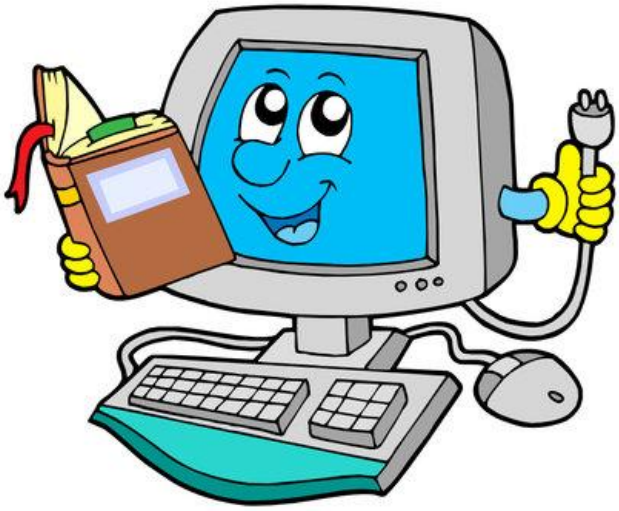
Education Is The

Most Powerful Weapon

Which You Can Use

To Change The World.

ALL THE BEST!



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