COMPUTER SCIENCE
STUDY MATERIAL

XI – STANDARD

(BASED ON THE NEW SYLLABUS AND NEW TEXT BOOK FOR THE YEAR 2024-2025)

PREPARED BY.,
B. MOHAMED YOUSUF M.C.A., B.Ed.,
PG ASST IN COMPUTER SCIENCE
[yousufaslan5855@gmail.com]

INDEX..,

CHAPTER 1 TO 18 BOOK BACK & PUBLIC ONE WORD QUESTION WITH ANSWERS

(CHAPTER-1) (INTRODUCTION TO COMPUTERS)

1. First generation computers used ---
(a)Vacuum tubes (b) Transistors (c) Integrated circuits (d) Microprocessors

2. Name the volatile memory--- **[M-2023, J-2023]**
(a) ROM (b) PROM **(c) RAM** (d) EPROM

3. Identify the output device **[M-2020]**
(a) Keyboard (b) Memory **(c) Monitor** (d) Mouse

4. Identify the input device
(a) Printer **(b) Mouse** (c) Plotter (d) Projector

5. …………… Output device is used for printing building plan, flex board, etc.
(a) Thermal printer **(b) Plotter** (c) Dot matrix (d) inkjet printer

6. In ATM machines, which one of the following is used to ------
(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 **[S-2020, J-2024]**
(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? **[M-2022, M-2024]**
(a) First (b) Second **(c) Third** (d) Fourth

1. Which generation of computer used transistors? **[J-2019]**
(a) First **(b) Second** (c) Third (d) Fourth

2. --- is the main component of second generation computers. **[AUG-2022]**
(a) Vacuum tubes **(b) Transistors** (c) IC (d) Microprocessors

(CHAPTER-2 PART-1) (NUMBER SYSTEMS)

1. Which refers to the number of bits processed by a computer's CPU? **[M-2024]**
(a) Byte (b) Nibble **(c) Word length** (d) Bit

2. How many bytes does 1 Kilo Byte contain? **[AUG-2022, J-2024]**
(a) 1000 (b) 8 (c) 4 **(d) 1024**

3. Expansion for ASCII
(a) American School Code for Information Interchange. **(b) American Standard Code for Information Interchange**
(c) All Standard Code for Information Interchange (d) American Society Code for Information Interchange

4. 2^50 is referred as
(a) Kilo (b) Tera **(c) Peta** (d) Zetta

5. How many characters can be handled in Binary Coded Decimal System?
(a) 64 (b) 255 (c) 256 (d) 128

6. For 1101_2 what is the Hexadecimal equivalent? **[M-2022]**
(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? **[S-2020]**
(a) 645 (b) 234 **(c) 876** (d) 123

1. For 1010_2 the hexadecimal equivalent is: **[M-2023]**
(a) C (b) B (c) E **(d) A**

2. 2^40 is referred as **[J-2023]**
(a) Kilo **(b) Tera** (c) Peta (d) Zetta

(CHAPTER-2 PART-2) (BOOLEAN ALGEBRA)

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? **[M-2020]**
(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**

1. Which gate circuits is an OR gate followed by an inverted? **[M-2019]**
(a) NOR (b) XNOR (c) AND (d) OR

(CHAPTER-3) (COMPUTER ORGANIZATION)

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? **[M-2022, J-2024]**
(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? **[M-2024]**
(a) Intel P6 (b) AMD K6 **(c) Pentium III** (d) Pentium IV

6. Which is the fastest memory? **[AUG-2022]**
(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? **[J-2023]**
(a) Blocks (b) sectors **(c) pits** (d) tracks

10. Display devices are connected to the computer through. **[M-2019, M-2023]**
(a) USB port (b) Ps/2 port (c) SCSI port **(d) VGA connector**

1. Which is used to connect a monitor or any display device like LCD projector to a computer? **[M-2019]**
(a) SCSI port **(b VGA connector** (c) USB port (d) PS/2 port

2. Pick the RISC processor: **[J-2019]**
(a) Intel P6 (b) Intel 386&486 (c) Pentium II (d) Motorola 6800

3. Which of the following is a very high speed and expensive memory? **[S-2020]**
(a) Cache (b) ROM (c) RAM (d) EPROM

(CHAPTER-4) (THEORETICAL CONCEPTS OF OPERATING SYSTEM)

1. Operating system is a ------- **[AUG-2022]**
(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? **[J-2019, S-2020]**
(a) Windows 7 (b) Linux (c) BOSS **(d) iOS**

6. File Management manages… **[M-2023]**
(a) Files (b) Folders (c) Directory systems **(d) All the Above**

7. Interactive Operating System provides----- **[M-2024]**
(a) Graphics User Interface (GUI) (b) Data Distribution
(c) Security Management (d) Real Time Processing

8. An example for single task operating system is **[M-2022]**
(a) Linux (b) Windows **(c) MS-DOS** (d) UNIX

9. The File management system used by Linux is **[J-2024]**
(a) ext2 (b) NTFS (c) FAT (d) NFTS

1. How many Level of securities is provided by operating system to the user? **[M-2020, J-2023]**
(a) 3 (b) 2 (c) 5 (d) 4

(CHAPTER-5) (WORKING WITH TYPICAL OPERATING SYSTEMS)

1. From the options given below, choose the operations managed by the Operating system
(a) Memory (b) Processor (c) I/O devices **(d) all of the above**

2. Which is the default folder for many Windows Applications to save your file? **[M-2020, J-2024]**
(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----- **[AUG-2022, M-2024]**
(a) F2 (b) F4 (c) F5 (d) F6

1. Which of the following key combination is used to permanently delete a file or folder without sending to recycle bin? **[M-2023]**
(a) Shift and delete (b) Alt and delete (c) Tab and delete (d) Ctrl and delete

2. Which command is used to 'paste'? **[M-2022]**
(a) Edit→ Paste (b) view → Paste (c) File → Paste (d) All the above

3. Which shortcut key is used to cut a file or folder? **[J-2023]**
(a) Ctrl+Alt+C (b) Ctrl+Alt+X (c) Ctrl+C **(d) Ctrl+X**

(CHAPTER-6) (SPECIFICATION AND ABSTRACTION)

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 – **[M-2024]**
(a) Specification **(b) abstraction** (c) composition (d) decomposition

4. Stating the input property and the as : output relation a problem is known **[M-2019, M-2023]**
(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

1. Ignoring or hiding unnecessary details and modelling an entity only by its essential properties is known as --- **[J-2019]**
(a) Specification **(b) Abstraction** (c) Composition (d) Decomposition

2. Which is specified by the properties of the given input and the relation between the input and the desired output. **[S-2020]**
(a) Specification (b) Statement **(c) algorithm** (d) Definition

(CHAPTER-7) (COMPOSITION AND DECOMPOSITION)

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

2. Which of the following properties is true after the assignment (at line 3? 1 -- i+j = 0 ; 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 if C1 S1 else if C25 S2 6 else 7 S3 executes—

(a) S1 **(b) S2** (c) S3 (d) none **[M-2019, M-2022]**

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 C true S1 false S2 C true S1 false S2 (1) (2)

(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 **[J-2019, M-2024, J-2024]**

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

1. After the assignment what values will be stored in the variables m ,n ?1) m,n: =10,5 2) m,n: =m+3,n-2 3) m,n: = ? **?**

(a) 3, 13 (b) 10, 13 **(c) 13,3** (d) 10,5 **[M-2020]**

2. Which of the following notation is a mix of programming language like constraints and plain English?

(a) Flow chart **(b) Pseudo-code** (c) Algorithm (d) Structure **[S-2020]**

3. How many times the loop is iterated ---- M: =0 While (m<5) M:=m+1 **[M-2020]**

(a) 10 (b) 4 **(c) 5** (d) 6

(CHAPTER-8) (ITERATION AND RECURSION)

1. A loop invariant need not be true **[M-2019]**

(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

0 n = 0 n = 0
F(n)= 1 n = 1 n = 1
F(n — 1) + F(n — 2) otherwise 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 = 1 if n = 0 axa^{n-1} otherwise
How many multiplications are needed to calculate a10? **[J-2023]**

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

1. The unchanging property of a variable in iteration is known as: **[J-2019]**

(a) Recursion **(b) Loop invariant** (c) Assignment (d) Condition

(CHAPTER-9 PART-1) (INTRODUCTION TO C++)

1. Who developed C++? **[S-2020, M-2022]**

(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 Barnes (c) Bill Gates (d) Dennis Ritchie

4. The smallest individual unit in a program is: **[M-2020]**

(a) Program (b) Algorithm (c) Flowchart **(d) Tokens**

5. Which of the following operator is extraction operator of C++? **[J-2019, AUG-2022, J-2023, J-2024]**

(a) >> (b) << (c) <> (d) ^^

6. Which of the following statements is not true?

(a) Keywords are the reserved words convey specific meaning to the C++ compiler
(b) Reserved words or keywords can be used as an identifier name
(c) An integer constant must have at least one digit without a decimal point
(d) Exponent form of real constants consists of two parts

7. Which of the following is a valid string literal? **[AUG-2022]**

(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? **[M-2019]**

(a) 4 (b) 5 (c) 1 (d) 0

10. Which of the following is called as compile time operators?

(a) Size of (b) pointer (c) virtual (d) this

1. Which of the following operator is received from operator of C++? **[J-2019]**

(a) >> **(b) <<** (c) <> (d) ^^

2. Which of the following is user defined data type? **[M-2020]**

(a) Char **(b) class** (c) float (d) int

3. Which can be used as alternate to \n? **[J-2019]**

(a) \t (b) \a **(c) end l** (d) \o

4. In C++ ----is used for pointer to a variable. **[M-2024]**

(a) - (b) + (c) ÷ **(d) ***

(CHAPTER-9 PART-2) (DATA TYPES, VARIABLES AND EXPRESSIONS)

1. How many categories of data types available in C++? **[M-2022]**

(a) 5 (b) 4 **(c) 3** (d) 2

2. Which of the following data types is not a fundamental type?

(a) Signed (b) int (c) float (d) char

3. What will be the result of following statement? char ch= 'B'; cout << (int) ch;

(a) B (b) b (c) 65 **(d) 66**

4. Which of the character is used as suffix to indicate a floating point value?

(a) F (b) C (c) L (d) D

5. How many bytes of memory allocates for the following variable declaration if you are using Dev C++? short int x;

(a) 2 (b) 4 (c) 6 (d) 8

6. What is the output of the following snippet? char ch = 'A'; ch = ch + 1;

(a) B (b) A1 (c) F (d) 1A

7. Which of the following is not a data type modifier?

(a) Signed **(b) int** (c) long (d) short

8. Which of the following operator returns the size of the data type? **[J-2024]**

(a) Size of ( ) (b) Int( ) (c) long ( ) (d) double ( )

9. Which operator to be used to access reference of a variable?

(a) $ (b) # **(c) &** (d)!

10. This can be used as alternate to endl command: **[M-2023]**

(a) \t (b) \b (c) \0 **(d) \n**

1. #include<iostream> using namespace std; int main() { int i=1, sum=0; while(i<=10){ sum=sum+i; i++; } cout<<sum; return 0;} The output of the following snippet is **[M-2024]**

(a) 55 (b) 54 (c) 51 (d) 50

(CHAPTER-10) (FLOW OF CONTROL)

1. What is the alternate name of null statement?

(a) No statement **(b) Empty statement** (c) Void statement (d) Zero statement

2. In C++, the group of statements should enclosed within:

(a) { } (b) [ ] (c) ( ) (d) < >

3. The set of statements that are executed again and again in iteration is called as:

(a) Condition (b) loop (c) statement **(d) body of loop**

4. The multi way branching statement: **[AUG-2022]**

(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++) **[M-2019]**

(a) 0 **(b) 10** (c) 9 (d) 11

7. Which of the following is the exit control loop? **[AUG-2022, J-2024]**
(a) For (b) while **(c) do…while** (d) if…else

8. Identify the odd one from the keywords of jump statements:
(a) Break **(b) switch** (c) goto. (d) continue

9. Which of the following is called entry control loop? **[M-2024]**
(a) Do-while **(b) for** (c) while (d) if-else

10. A loop that contains another loop inside its body:
(a) Nested loop (b) Inner loop (c) Inline loop (d) Nesting of loop

1. #include<iostream> using namespace std int main() { int i, sum=5; for(i=1;i<=5;i++) { sum=sum+i} cout<<sum; return 0;} The output for the following snippet is: **[M-2023]**
(a) 20 (b) 10 (c) 25 (d) 15

2. Which of the following statement is used to terminate the execution of the loop ----- **[M-2020]**
(a)While (b) go to **(c) break** (d) continue

3. How many times the following loop will execute? for (int i=1; i<10; i++) **[M-2022]**
(a) 11 **(b) 9** (c) 0 (d) 10

4. Which is not a jump statements in C++? **[S-2020]**
(a) Break (b) go to **(c) Switch** (d) continue

5. How many times the following loop will execute? for (int i=1; i<5; i++) **[J-2023]**
(a) 2 **(b) 5** (c) 6 (d) 10

(CHAPTER-11) (FUNCTIONS)

1. Which of the following header file defines the standard I/O predefined functions? **[S-2020]**
(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. **[M-2019, M-2020, J-2024]**
(a) isalpha( ) (b) isdigit( ) **(c) isalnum( )** (d) islower( )

3. Which function begins the program execution? **[J-2019, AUG-2022, M-2023]**
(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? **[M-2019, M-2024]**
(a) > (b) & (c) % **(d) ::**

1. Int x=10; int main() { int x=100; cout<< ::x;} The output for above snippet is : **[M-2022]**
(a) 100 (b) x (c) ::x **(d) 10**

2. If two strings are equal, then strcmp() function returns which value? **[J-2023]**
(a) 0 (b) -1 (c) +1 (d) =

(CHAPTER-12) (ARRAYS AND STRUCTURES)

1. Which of the following is the collection of variables of the same type that an referenced by a common name?
(a) int (b) float **(c) Array** (d) class **[M-2022]**

2. int age[ ]={6,90,20,18,2}; How many elements are there in this array? **[J-2024]**
(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.
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
(a) Structure variable (b) structure tag (c) structure member (d) structure function

1. int age[ ]={6,80,75,21,10}; How many elements are there in this array? **[M-2020]**
(a) 2 **(b) 5** (c) 6 (d) 4

2. int age[ ]={6,90,12,18,2}; How many elements are there in this array? **[AUG-2022]**
(a) 2 **(b) 5** (c) 6 (d) 4

3. cin>>n[4]; To which element does this statement accepts the value? **[M-2019]**
(a) 2 (b) 3 (c) 4 **(d) 5**

4. Array subscripts is always starts with which number? **[J-2019]**
(a) -1 (b) 2 (c) 0 (d) 3

5. Which keyword is used to create structure in C++? **[J-2019, S-2020]**
(a) struct (b) structure (c) void (d) const

(CHAPTER-13) (INTRODUCTION TO OBJECT ORIENTED PROGRAMMING TECHNIQUES)

1. The term is used to describe a programming approach based on classes and objects is – **[M-2023]**
(a) OOP (b) POP (c) ADT (d) SOP

2. The paradigm which aims more at procedures…programming
(a) Object Oriented **(b) Procedural** (c) Modular (d) Structural

3. Which of the following is a user defined data type? **[M-2020]**
(a) Class (b) float (c) int. (d) Object

4. The identifiable entity with some characteristics and behavior is. **[J-2023]**
(a) Class **(b) object** (c) structure (d) member

5. The mechanism by which the data and functions are bound together into single unit is known as ---- **[M-2024]**
(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---- **[M-2022, J-2024]**
(a) Redundancy **(b) reusability** (c) modification (d) composition

10. Which of the following supports the transitive nature of data? **[S-2020]**
(a) Inheritance (b) Encapsulation (c) Polymorphism (d) Abstraction

1. Which of the following is a technique of building new classes from an existing class? **[J-2019]**
(a) Inheritance (b) Abstraction (c) Encapsulation (d) Polymorphism

(CHAPTER-14) (CLASSES AND OBJECTS)

1. The variables declared inside the class are known as data members and the functions are known as ---
(a) Data functions (b) inline functions (c) member functions. **(d) Attributes**

2. Which of the following statements about member functions are true or false?
i) A member function can call another member function directly with using the dot operator.
ii) Member function can access the private data of the class.
(a) i-True, ii-True **(b) i-False, ii-True** (c) i-True, ii-False (d) i-False, ii-False

3. A member function can call another member function directly, without using the dot operator called as
(a) Sub function (b) sub member
(c) nesting of member function (d) sibling of

4. The member function defined within the class behave like :
(a) Inline functions (b) Non inline function (c) Outline function (d) Data function

5. Which of the following access specifies protects data from in advertent modifications?
(a) Private (b) Protected (c) Public (d) Global

6. class x ---- 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 proto type? **[M-2024]**
Add display (add &); // add is a class name
(a) Default (b) Parameterized **(c) Copy** (d) Non-Parameterized

1. Class product { int code, quantity; float price; int main() { product p1,p2; return 0;
How many bytes will be allocated with memory space of objects (p1)? **[AUG-2022]**
(a) 4 bytes (b) 8 bytes **(c) 12 bytes** (d) 2 bytes

2. The functions that perform specific tasks in a class is called: **[M-2022]**
(a) Inline functions (b) Data members **(c) Member functions** (d) Online functions

3. How many number of destructors can a class in C++ contain? **[S-2020]**
(a) 4 (b) 3 (c) 2 **(d) 1**

4. How many access specifies declared inside class definition? **[AUG-2022]**
(a) 3 (b) 2 (c) 4 (d) 1

5. A constructor that accepts no parameter is called as: **[J-2023]**
(a) Parameterized (b) Copy **(c) default** (d) non- parameterized

(CHAPTER-15) (POLYMORPHISM)

1. Which of the following refers to a function having more than one distinct meaning? **[J-2024]**
(a) Function Overloading (b) Member overloading (c) Operator (d) Operations

2. Which of the following reduces the number of comparisons in a program? **[J-2019]**
(a) Operator overloading (b) Operations **(c) Function Overloading** (d) Member

3. Void dispchar(char ch='$',int size=10) 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? **[M-2023]**
(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 (intx);
void fun (char ch) ;
	**(b) void fun (intx);
	void fun (inty);**
		(c) void fun (double d);
		void fun (char ch);
			(d) void fun (double d);
			void fun (inty);

(CHAPTER-16) (INHERITANCE)

1. Which of the following is the process of creating new classes from an existing class— **[S-2020]**
(a) Polymorphism **(b) Inheritance** (c) Encapsulation (d) super class

2. Which of the following derives a class student from the base class school **[M-2019]**
(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** (d) Hybrid

4. Which visibility mode should be used when you want the features of the Base class to be available to the derived class but not to the classes that are derived from the derived class?
(a) Private (b) Public (c) Protected. (d) All of these

5. Inheritance is process of creating new class from --- **[J-2024]**
(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** (c) single (d) double

7. Which amongst the following is executed in the order of inheritance? **[J-2019, M-2020, M-2023]**
(a) Destructor (b) Member function **(c) Constructor** (d) Object

8. Which of the following is true with respect to inheritance?
(a) Private members of base class are inherited to the derived class with private
(b) Private members of base class are not inherited to the derived class with private accessibility.
(c) Public members of base class are inherited but not visible to the derived class
(d) Protected members of base class are inherited but not visible to the outside class

9. **Based on the following class declaration answer the questions (from9.1 9.4)**

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 display data( )
(a) Passenger (b) load (c) Ticket **(d) All of these**

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

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

1. How many types are there in heritance? **[AUG-2022]**
(a) 5 (b) 4 (c) 3 (d) 2

2. Inheritance is the process of creating new class from: **[J-2023]**
(a) Base class (b) Abstract (c) Derived class (d) Function

(CHAPTER-17) (COMPUTER ETHICS AND CYBER SECURITY)

1. Which of the following deals with procedures, practices and values? **[M-2020, M-2022]**
(a) Piracy (b) programs (c) virus (**d) computer ethics**

2. Commercial programs made available to the public illegally are known as---- **[M-2023]**
(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 **[S-2020]**

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? **[J-2019]**
(a) Worms (b) Trojans (c) spyware (**d) cookies**

6. A computer network security that monitors and controls incoming and outgoing traffic is ------ **[M-2019, J-2024]**
(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 (c) electric data (d)electronic commercialization

9. Distributing unwanted e-mail to others is called. **[J-2023, M-2024]**
(a) Scam (**b) spam** (c) fraud (d) spoofing

10. Legal recognition for transactions are carried out by **[M-2024]**
(a) Electronic Data Interchange (b) Electronic Data Exchange
(c) Electronic Data Transfer (d) Electrical Data Interchange

1. Which one of the following is Harass through online? **[AUG-2022]**
(a) Cyber terrorism (b) Scam **(c) Cyber Stalking** (d) Fraud

(CHAPTER-18) (TAMIL COMPUTING)

1. Which is not a search engine? **[M-2022]**
(a) Android (b) Bing (c) Yahoo (d) Google

2. Which of the following is the first Tamil Programming language? **[S-2020, J-2023]**
(a) Kamban (b) Azhagi (c) Tamil Open Office **(d) Ezhil**

3. Which one of the following is Harass through online? **[AUG-2022]**
(a) Cyber terrorism (b) Scam **(c) Cyber stalking** (d) Fraud

CHAPTER 1 TO 18 BOOK INSIDE ONE WORD ANSWERS ONLY

(CHAPTER-1) (INTRODUCTION TO COMPUTERS)

1. How many types of booting process in system?
(a) 3 **(b) 2** (c) 5 (d) 4

2. Which generation of computer used transistors?
(a) First **(b) Second** (c) Third (d) Fourth

3. --- is the main component of second generation computers
(a) Vacuum tubes **(b) Transistors** (c) IC (d) Microprocessors

4. Expand ENIAC:
(a) Electronic numerical integrator and calculator (b) Electric numerical integrator and calculator
(c) Electronic numerical and computer (d) Electric numerical integrator and computer

5. Plotter is a ----------Device
(a) Storage (b) input **(c) Output** (d) Memory

6. Line printers are capable of printing much more than ---lines per minutes
(a) 1000 (b) 1200 (c) 1500 (d) 1300

7. Which generations of computer of computer used ULSI?
(a) Third (b) Fourth **(c) Fifth** (d) Sixth

8. Natural language processing is a component of ……………..
(a) ULSI **(b) AI** (c) ENIAC (d) OCR

9. Computer is an …………….. device.
(a) Electrical **(b) Electronic** (c) Digital (d) Memory

10. Main component of second generation ……………..
(a) vacuum tubes (b) microprocessor (c) integrated circuits **(d) transistor**

11. Microprocessor is the component of …………….. generation.
(a) first **(b) fourth** (c) third (d) all the above

12. Hardware is the …………….. component of a computer.
(a) physical (b) electrical (c) electronic (d) user

13. The printing speed of Impact printers varies from ……………..
(a) 40 to 1540 CPS (b) 50 to 150 CPS (c) 90 to 1500 CPS **(d) 30 to 1550 CPS**

14. Which printer using the carbon papers ……………..
(a) laser printer (b) non – impact printers **(c) Impact printer** (d) all the above

15. The speed of inkjet printers generally range from ……………..
(a) 1 – 20 PPM (b) 1 – 22 PPM (c) 10 – 20 PPM (d) 11 – 20 PPM

16. Retinal scanner uses the technique of ……………..
(a) GUI (b) UI **(c) Biometric** (d) None of these

17. Biometric technique followed by ……………..
(a) printer (b) plotter **(c) finger print scanner** (d) OCR

18. The components of CPU ……………..
(a) control unit (b) ALU (c) Memory unit **(d) all the above**

19. The primary memory is embedded with …………….. types of technologies.
(a) 2 (b) 3 (c) 5 (d) 7

20. Computer monitor displays the information in the form of ………………
(a) vertical **(b) pictorial** (c) horizontal (d) numeric

21. Processed data is ……………..
(a) information (b) primary data (c) data (d) message

22. Who invented analytical engine?
(a) Charles Babbage (b) John von Newman (c) Blaise pascal (d) Dennis Richard

23. Assembly language was introduced in which computer generation?
(a) First **(b) Second** (c) Third (d) Fourth

24. In which generation UNIVACI was used?
(a) First (b) Second (c) Third (d) Fourth

25. IBM 1401 belongs to which computer generation?
(a) First **(b) Second** (c) Third (d) Fourth

26. IBM 1620 belongs to which computer generation of computers?
(a) I **(b) II** (c) III (d) IV

27. UNIVAC 1108 belongs to which generation?
(a) First (b) Third **(c) Second** (d) Fourth

28. Honeywell 6000 series belongs to ……………… generation.
(a) First (b) Second **(c) Third** (d) Fourth

29. Which is the first fully functional electronic computer?
(a) EBSAC **(b) ENIAC** (c) EDSAC (d) EDIAC

30. NLP is a component of ………………
(a) AI (b) Hardware (c) Circuit (d) Electronics

31. Which is a raw fact about an entity?
(a) Information (b) Processed data **(c) data** (d) record

32. Which input device is a pointing device?
(a) Keyboard (b) Monitor **(c) Mouse** (d) Scanner

33. Which controls the entire operation of a computer?
(a) ALU **(b) CU** (c) BUS (d) I/O unit

34. Arithmetic and logical computation are done by ………………
(a) CU **(b) ALU** (c) BUS (d) memory

35. Which of the following stores the instructions and data?
(a) ALU (b) CU (c) BUS **(d) memory**

36. Which conveys information to the user in an understandable form?
(a) Input unit (b) CU **(c) Output unit** (d) Bus

37. Which is a volatile memory?
(a) Primary memory (b) Secondary memory (c) ROM (d) EPROM

38. CD – ROM, DVD – ROM, DVD – ROM are examples of which of the following memory.
(a) read / write (b) volatile (c) primary **(d) non – volatile**

39. Hard disk. CD – ROM, DVD – ROM are examples of which of the following memory.
(a) read only (b) primary **(c) secondary** (d) volatile

40. Caps lock key, Num lock key are ………………
(a) Functional keys **(b) Lock keys** (c) GUI keys (d) Direction keys

41. Mechanical, optical and laser are types of which input device.
(a) Keyboard **(b) Mouse** (c) Scanner (d) Printer

42. Who invented mouse?
(a) Douglas Engelbart (b) Blaise paseal (c) Bill gates (d) Eckert

43. Which one of the following mouse type has more than 3 buttons and can be programmed?
(a) Mechanical (b) Optical **(c) Laser** (d) 3D

44. The non – impact printer using similar technology used by photo copier is ……………… printer.
(a) Inkjet (b) dot matrix **(c) laser** (d) line matrix

45. The device that reads the information directly into the computer's memory and works like a Xerox machine is
(a) plotter **(b) scanner** (c) touch screen (d) track ball

46. The output device used to display computer output on big screen is ………………
(a) line matrix printer (b) dot matrix printer **(c) multimedia projector** (d) monitor

47. The output device similar to upside-down design of a mouse ………………
(a) laser mouse (b) optical mouse (c) mechanical mouse **(d) track ball**

48. Which of the following uses biometrics and unique pattern of retinal blood vessels?
(a) Retinal track (b) Finger print scanner (c) Optical scanner **(d) Retinal scanner**

49. Which input device is a pointing device?
(a) Keyboard (b) Monitor **(c) light pen** (d) Scanner

50. The input device that detects characters printed or written on paper is ………………
(a) Voice input system (b) Track ball **(c) Optical character reader**(d) 3D mouse

51. ……………… converts spoken words to machine-readable form.
(a) Voice input system (b) Speaker (c) Optical character reader (d) Scanner

52. CCD stands for ………………
(a) Code Converting Device (b) Code Change Device(c) Change Code Device **(d) Charge Coupled Device**

53. The input device in which 4 to 50 keys are arranged in the cluster.
(a) Keyboard (b) Mouse keys **(c) Keyer** (d) Scanner

54. ……………… are picture elements.
(a) Picture Point (b) Monitor (c) Routers **(d) Pixels**

55. The ……………… printer use the same technology used by photo copier.
(a) Inkjet (b) dot matrix (c) line **(d) laser**

56. Which is the first step when you on the computer?
(a) Default application is executed **(b) BIOS starts** (c) Printer drivers are loaded (d) Checks FAT

57. Printer are of types.
(a) 2 (b) 3 (c) 4 (d) 5

58. The two types of booting are ………………
(a) soft and hard **(b) warm and cold** (c) heavy and light (d) standard and default

59. Who is considered to be the father of computers?
(a) Charles Babbage (b) John Von Nuemann (c) John Napier (d) Dennis Ritchie

60. Analytical engine was developed in the year.
(a) 1827 **(b) 1837** (c) 1847 (d) 1857

61. Who invented ENIAC?
(a) J. Presper Eckert (b) J. Napier (c) J. Van Nueman (d) J. Mauchaley

62. Identify the computer which belongs to third generation?
(a) EDVAC (b) ENIAC (c) IBM 1620 **(d) IBM 360**

63. Which is used as a component of second generation computers?
(a) Vacuum Tubes **(b) Transistor** (c) IC (d) VLSI

64. Expand BIOS?
(a) Basic Input Output System (b) Biased Input Output System
(c) Battery Input Output System (d) Booting Input Output System

65. Expand CPS.
(a) Correction Per Second **(b) Characters Per Second**
(c) Calculations Per Second (d) Cording Per Second

66. Expand ENIAC.
(a) Electronic Number Integrated Algebra Calculation **(b) Electronic Numerical Integrator and Calculator**
(c) Electronic Null Interpreter and Compiler (d) Electronic Null Interpreter and Compiler

67. Which is the first known calculating device?
(a) Slide rule (b) Rotating wheel calculator **(c) Abacus** (d) Daisywheel

68. Artificial Intelligence was introduced in which generation of computers?
(a) V (b) II (c) III (d) IV

69. In which generation of computers, NLP was developed?
(a) First (b) Second (c) Fifth **(d) Sixth**

70. Expand NLP?
(a) Natural Language Processing (b) Netural Language Processing
(c) New Laptop Processor (d) New Language Processor

71. OCR stands for ………………
(a) Optimal Compiler Recorder **(b) Optimal Character Recorder**
(c) Optimum Charge Recorder (d) Optimal Character Resolution

72. Which is the meaning for the term computer?
(a) To estimate **(b) To calculate** (c) To connect (d) To think

73. Which is not a hardware component?
(a) Information (b) Monitor (c) Motherboard (d) Keyboard

74. What is the expansion of IPO?
(a) Input Process Output (b) Internal Process Outsourcing
(c) Integrated program Output (d) Integral project Output

75. How many major classifications of memory are there?
(a) 2 (b) 3 (c) 4 (d) 5

76. Which of the following input device scan the book?
(a) OMR **(b) OCR** (c) ECR (d) OVR

77. Which of the folliwng is the two dimensional bar code?
(a) QR (b) OCR (c) OMR (d) MICR

78. Which of the following input devices are classified as tactile, ergonomic, gaming?
(a) Keyboard (b) Printer (c) Monitor **(d) Mouse**

79. The main advantage of using the light pen is... (a) easy to use (b) accurate
(c) easy to detect the characters **(d) drawing directly onto the screen**

80. When was the first computer monitor released?
(a) March 1, 1973 (b) March 1, 1972 (c) March 1, 1974 (d) March 1, 1970

81. The individual keys for letters, numbers and special characters are collectively called …keys.
(a) character (b) functional (c) lock (d) special

82. Which of the following device converts photographs into digital format?
(a) Digital camera (b) Mouse **(c) Scanner** (d) Light pen

83. Wired, wireless and virtual are the categories of ……………….
(a) mouse (b) keyboard (c) printer (d) monitor

84. Line printers can print how many lines per minute?
(a) 1500 (b) 1520 **(c) 1000** (d) 1020

85. Which one of the following is the main characteristics of laser printer?
(a) Speed **(b) Resolution** (c) Reliability (d) Durability

86. Each dot in dot matrix printers produced by a tiny metal rod is called ……………….
(a) binary (b) pixel (c) resolution **(d) wire or pin**

87. Expand DPI ……………….
(a) Dots Per Inch (b) Dark Pen Ink (c) Dark Page Ink (d) Double Part ink

(CHAPTER-2 PART-1) (NUMBER SYSTEMS)

1. Which one of the following code system is integrated with Unicode?
(a) BCD (b) ASCII (c) EBCDIC **(d) ISCII**

2. For 1100_2 .What is the hexadecimal equivalent ……..
(a) D **(b) C** ` (c) A (d) B

3. $(10100110)_2 = (\ )_{16}$
(a) A5 (b) B5 **(c) A6** (d) B6

4. 2^70 is referred as
(a) Kilo (b) TERA (c) PETA **(d) ZETTA**

5. Which of the following ASCII value of numeric 0?
(a) 50 (b) 32 **(c) 48** (d) 51

6. Which of the following radix value of decimal?
(a) 8 **(b) 10** (c) 2 (d) 16

7. For 1010_2 the hexadecimal equivalent is:
(a) C (b) B (c) E **(d) A**

8. The simplest method to represent negative binary number is called ………………..
(a) signed magnitude (b) sign bit or parity bit (c) binary (d) decimal

9. The term data comes from the word ………………..?
(a) number **(b) datum** (c) nibble (d) bit

10. Expansion for BCD ………………..
(a) Binary coded decimal (b) binary complement decimal
(c) binary computer decimal (d) binary convert decimal

11. ……………….. scheme is denoted by hexadecimal numbers.
(a) binary **(b) Unicode** (c) word length (d) data

12. A ……………….. number is represented using base 16.
(a) Hexadecimal (b) octal (c) binary (d) decimal

13. The convert $(65)_{10}$ into its equivalent octal number ………………..
(a) $(101)_8$ (b) $(101)_{10}$ (c) $(101)_{12}$ (d) $(101)_4$

14. Octal number system uses digits ………………..
(a) 7 (b) 5 **(c) 8** (d) 10

15. ……………….. is the general idea behind positional numbering system.
(a) Radix (b) Computer memory (c) Binary number (d) Decimal number

16. Bit means ………………..
(a) nibble (b) byte (c) word length **(d) binary digit**

17. The computer can understand ……………….. languages.
(a) computer **(b) machine** (c) post (d) pre

18. How many bytes does 1 zetta byte contains?
(a) 2^{90} (b) 2^{80} **(c) 2^{70}** (d) 2^{60}

19. The collection of 4 bits is ………………..
(a) bit (b) byte **(c) nibble** (d) KB

20. 1 kilo byte represents ……………….. bytes.
(a) 512 (b) 256 **(c) 1024** (d) 64

21. How many mega bytes does 1 GB contains?
(a) 2^{20} **(b) 2^{10}** (c) 2^{30} (d) 2^{40}

22. What is the decimal value of 1111_2?
(a) 10 (b) 11 (c) 14 **(d) 15**

23. What is the 1' s complement of 11001.
(a) 11100110 (b) 01010101 (c) 11110000 (d) 100100111

24. The decimal value of Binary number 10 is ………………..
(a) 101010 **(b) 2** (c) 100 (d) A

25. The hexadecimal equivalent of 15 is ………………..
(a) A (b) B (c) E **(d) F**

26. Which of the following are data?
(a) Alphabet (b) Special character (c) Number **(d) All of these**

27. The radix of hexadecimal number is ………………..
(a) 2 (b) 8 **(c) 16** (d) 10

28. Pick the odd one.
(a) BCD **(b) ENIAC** (c) ASCII (d) EBCDIC

29. The most commonly used number system is ………………..
(a) binary **(b) decimal** (c) octal (d) hexadecimal

30. Unicode can handles how many characters?
(a) 64 (b) 128 (c) 256 **(d) 65536**

31. What does MSB means?
(a) Major sign bit (b) Most sign bit (c) Minor sign bit **(d) Most significant bit**

32. Which one is the right most bit?
(a) MSB **(b) LSB** (c) USB (d) USRB

33. The binary equivalent of hexadecimal number B is ………………..
(a) 1011 (b) 1100 (c) 1001 (d) 1010

34. The left most bit of a positive binary number in signed notation is ………………..
(a) 0 (b) 1 (c) 2 (d) A

35. What is the range of ASCII values for lower case alphabets?
(a) 65 to 90 (b) 65 to 122 **(c) 97 to 122** (d) 98 to 122

36. The radix for octal number system is ………………..
(a) 2 **(b) 8** (c) 1 (d) 16

37. What is the ASCII value for blank space?
(a) 8 (b) 2 (c) 18 **(d) 32**

38. Which one of the following company have formulated EBCDIC?
(a) Microsoft **(b) IBM** (c) Sun (d) Apple

39. Which one of the following bit has smallest positional weight?
(a) MSB **(b) LSB** (c) UPS (d) USB

40. The base value of hexadecimal number is ………………..
(a) 2 (b) 8 **(c) 16** (d) 18

(CHAPTER-2 PART-2) (BOOLEAN ALGEBRA)

1. A.A=?
(a) A (b) 0 (c) 1 (d) $\bar{A}$

2. Which gate circuits is an OR gate followed by an inverted?
(a) NOR (b) XNOR (c) AND (d) OR

3. $\bar{\bar{A}}$ (Double bar) = ----
(a) A (b) 1 (c) 0 (d) A

4. The ……………….. operator is defined in boolean algebra by the use of the dot (.) operator.
(a) AND (b) OR (c) NOT (d) NAND

5. The NAND gate operates an AND gate followed by a ……………….. gate.
(a) AND (b) OR **(c) NOT** (d) XOR

6. Name the person who proposed the basic principles of Boolean Algebra?
(a) Wiliam Boole **(b) George Boole** (c) James Boole (d) Boolean George

7. How many truth values are there?
(a) 2 (b) 3 (c) 4 (d) 5

8. What is the other name for logical statement?
(a) Truth values **(b) Truth functions** (c) Truth table (d) Truth variables

9. The variables which can store the truth values are called as ………………..
(a) logical variable (b) binary valued variable (c) boolean variables **(d) all of these**

10. The NOT operator is represented by the symbol.
(a) over bar (b) single apostrophe **(c) a and b** (d) plus

11. Which is not a logical operator?
(a) dot (b) plus (c) over bar **(d) command**

12. The output for the AND operator is ………………..
(a) A + B (b) – **(c) A.B** (d) AB + C

13. Which symbol is used to in OR operator?
(a) – (b) • (c) * **(d) +**

14. Which gate takes only one input?
(a) OR (b) AND **(c) NOT** (d) XOR

15. Which among the following can be replaced by a bubbled AND gate?
(a) AND **(b) NAND** (c) OR (d) not

16. Which is not a derived date?
(a) AND (b) NAND (c) NOR (d) XOR

17. Find the universal gates from the following.
(a) XOR (b) XNOR (c) a and b **(d) NOR**

18. Which symbol is used in XOR gate?
(a) ⊙ (b) ⊗ **(c) ⊕** (d) –

19. What is the output of XOR gate?
(a) C = A% B (b) C = A ⊗ A (c) C = A ⊙ B **(d) C = A ⊕ B**

20. Identify the statement which is wrong.
(a) A . 1 = A **(b) A . A = A** (c) A + O = A (d) A . 1 = 0

21. With 2 inputs in the truth table, how many set of values will be obtained.
(a) 4 (b) 8 (c) 2 (d) 1

(CHAPTER-3) (COMPUTER ORGANIZATION)

1. ------ Ports helps to connect keyboard and mouse
(a) SCSI (b) SERIAL **(c) PS/2** (d) Parallel

2. Blue Ray disc can store up to-----
(a) 50 (b) 6.4 (c) 6.2 (d) 70

3. To connect mouse and keyboard to PC ----is used
(a) VGA (b) SCSI **(c) PS/2** (d) HOMI

4. Which is used to connect a monitor or any display device like LCD projector to a computer?
(a) SCSI port **(b VGA connector** (c) USB port (d) PS/2 port

5. Pick the RISC processor:
(a) Intel P6 (b) Intel 386&486 (c) Pentium II (d) Motorola 6800

6. Which of the following is a very high speed and expensive memory?
(a) Cache (b) ROM (c) RAM (d) EPROM

7. Which is the fastest memory?
(a) Reduced interactive set computer (b) Reading information set computer
(c) Reduced instruction set computer (d) Released information set computer

8. The ……………… is the major component of a computer, which performs all taks.
(a) CPU (b) MDR (c) MAR (d) RISC

9. The speed at which the microprocessor executes instructions is called ………………
(a) Instruction set (b) word size **(c) clock speed** (d) control flow

10. The number of bits that can be processed by a processor in a single instruction is called--
(a) word size (b) CPU (c) Data transfer (d) CISC

11. The main memory is otherwise called as ………………
(a) cache memory (b) main memory (c) hard disk **(d) random access memory**

12. ………………. is a magnetic disk on which you can store data.
(a) compact disc **(b) hard disk** (c) DVD (d) flash memory devices

13. ………………. is a high – density optical disc similar to DVD.
(a) Blu – Ray disc (b) digital versatile disc (c) flash memory devices (d) compact disc

14. ………………. connect the hard disk drives and network connectors.
(a) PS/2 port **(b) SCSI port** (c) USB port (d) serial port

15. . is an electronic (solid – state) non – volatile computer storage medium that can be electrically erased and reprogrammed.
(a) main memory **(b) flash memory** (c) Blu – Ray disc (d) USB

16. The micro processors were first introduced in early ……………….
(a) 1976 (b) 1975 **(c) 1970** (d) 1978

17. ………………. is commonly used to measure wave frequencies.
(a) Hertz (b) internal memory (c) RAM (d) ALU

18. Which one of the following deals with hardware components of a computer system.
(a) Computer organization (b) Computer architecture
(c) System software (d) Application software

19. Computer architecture deals with ……………..
(a) designing the computer (b) input devices (c) output devices (d) memory

20. The first general purpose microprocessor was ……………….
(a) IBM 2002 (b) IBM 1620 **(c) Intel 4004** (d) Intel 4002

21. Which one of the following is a programmable multipurpose silicon chip and are driven by clock pulses?
(a) Hardware (b) Memory **(c) Microprocessor** (d) Clock

22. Which of the following temporarily holds the instructions and data for execution of the processor.
(a) ALU (b) CU **(c) Registers** (d) RAM

23. How many types of system buses are available?
(a) 2 **(b) 3** (c) 4 (d) 5

24. System bus is a collection of ……………….
(a) address bus (b) data bus (c) control bus **(d) all of these**

25. Which one of the following bus serves as a communication channel between the microprocessor and other devices.
(a) Address bus (b) Data bus **(c) Control bus** (d) Process bus

26. MHz arid GHz are the units of ……………….
(a) clock speed (b) instruction set (c) Word size (d) system bus

27. An average human ear can detect sound waves between ……………….
(a) 20 to 200 Hz (b) 20 to 2000 Hz **(c) 20 to 20000 Hz** (d) 20 to 200000 Hz

28. One hertz is equal to ………………. cycles per second.
(a) 1 (b) 10 (c) 2 (d) 20

29. Which among the following is not an operation carried out Instruction set?
(a) Arithmetic operations (b) Logical operations (c) Control flow **(d) Bitwise operations**

30. The amount of RAM that can be accessed by a microprocessor at one time is determined by …
(a) clock speed **(b) word size** (c) instruction (d) software

31. Intel 8085 is a ………………. bit processor.
(a) 8 (b) 16 (c) 32 (d) 64

32. What will be the value of of control line for read operation from RAM to MDR?
(a) 1 (b) 0 (c) 5 (d) 2

33. Which bus is unidirectional?
(a) Control (b) System (c) Data **(d) Address**

34. Which of the following digital circuit is used to point to the specific memory location where the word can be located?
(a) Logic gate (b) Transistor (c) Encoder **(d) Decoder**

35. How many classifications of microprocessors are there based on data width?
(a) 2 (b) 3 **(c) 4** (d) 5

36. Which one of the following is not a RISC processor?
(a) Pentium IV (b) AMD K6 (c) Intel P6 **(d) AMD K8**

37. Which one of the following is not a CISC processor?
(a) Pentium II (b) Pentium III **(c) Pentium IV** (d) Pentium

38. Which of the following memory is of higher cost?
(a) Hard disk (b) Main memory **(c) Cache memory** (d) Floppy

39. Which of the following needs refreshing very often?

(a) ROM (b) Static RAM **(c) Dynamic RAM** (d) EPROM

40. In which of the following memory, contents can be erased by exposing to ultraviolet rays?

(a) ROM **(b) EPROM** (c) PROM (d) RAM

41. The time taken to respond to a read/write operation is …………………

(a) response time (b) access time **(c) both (a) and (b)** (d) sequential time

42. CD data represented as tiny indentations are called …………………

(a) tracks (b) sectors (c) stacks **(d) pits**

43. Which one of the following has the stacked arrangement of disks?

(a) CD (b) DVD (c) Blu – Ray **(d) Hard disk**

44. A 12 cm diameter DVD with single sided, single layer has the storage capacity of …………………

(a) 4.7 GB (b) 8.7 GB (c) 8.5 GB (d) 1.5 GB

45. What is the colour of double layered sides DVD?

(a) Silver (b) Green **(c) Gold** (d) Brown

46. Which type of disc is : used for playing High-Definition movies?

(a) CD (b) DVD (c) Flash Devices **(d) Blu – Ray Disc**

47. DVD uses a ………………… colour laser to read and write data.

(a) red (b) green (c) blue (d) orange

48. Blu – ray uses a ………………… laser to write data.

(a) red (b) green **(c) blue – violet** (d) violet

49. USB 3.0 can transfer data up to …………………

(a) 3 GB/sec **(b) 5GB/sec** (c) 5GB/min (d) 3GB/min

50. Which port is used to LCD projector?

(a) SCSI (b) PS/2 (c) Audio **(d) VGA port**

51. The areas between the pits in CD's are called …………………

(a) memory (b) bus (c) buffer **(d) lands**

52. Which one of the following uses magnetic disk to store the data?

(a) DVD **(b) HD** (c) CD (d) FD

53. How are sound waves close to 20 Hz with low pitch called?

(a) Treble (b) Tremble **(c) Bass** (d) Accumulator

54. Which of the following interface transfers the uncompressed audio and video data to monitor, projector?

(a) CD (b) DVD **(c) HDMI** (d) FDD

(CHAPTER-4) (THEORETICAL CONCEPTS OF OPERATING SYSTEM)

1. How many Level of securities is provided by operating system to the user?

(a) 3 (b) 2 (c) 5 (d) 4

2. --- is the combination of hardware and software

(a) CPU (b) Memory **(c) Computer** (d) Projector

3. Which one of the following is system software?

(a) MS-Word (b) VLC player (c) MS-Excel **(d) Language processor**

4. Android is a---

(a) Mobile O.s (b) Open source O.s (c) Developed by ibm (d) All the above

5. The following few uses of operating system:

(i) To ensure computer can be used to extract what the user wants it do.

(ii) Controlling input and output devices. Which statement give above is/are correct?

(a) (i) only **(b) Both** (c) (ii) only (d) None

6. Software is classified into ……………… types.

(a) five **(b) two** (c) four (d) six

7. A computer consists of a collection of processes, they are classified as ……………… categories.

(a) 7 (b) 3 (c) 8 **(d) 2**

8. Which one of the following is not an algorithm?

(a) NTFS (b) FIFO (c) SJE (d) Round Robin

9. The operating system provides ……………… levels of securities to the user end.

(a) three (b) five (c) seven (d) ten

10. Which one of the following is not a prominent operating system?

(a) UNIX (b) IOS **(c) GUI** (d) Android

11. ………………. is a family of multitasking.

(a) LINUX (b) Microsoft Windows (c) UNIX (d) iOS

12. Which one of the following comes under proprietary license?

(a) Apple Mac OS (b) Google's Android (c) UNIX (d) LINUX

13. The LINUX operating system was originated in ……………….

(a) 1996 (b) 1998 (c) 2000 **(d) 1991**

14. ………………. is the second most popular mobile operating system globally after Android.

(a) Microsoft Windows **(b) iOS** (c) UNIX (d) LINUX

15. Which one of the following is an application software to play audio and video files?

(a) Audio Player (b) Media Player **(c) VLC Player** (d) All of these

16. Which one of the following is a System software?

(a) Operating System (b) Language Processor **(c) Both a & b** (d) none of these

17. Which one of the following is a set of instructions that perform specific tasks?

(a) Hardware **(b) Software** (c) Processor (d) I/O devices

18. Hardware and software are managed by ……………….

(a) GUI **(b) OS** (c) Bootstrap (d) keyboard

19. The process of starting computer operation automatically when the power is turned on is called …

(a) Booting (b) Compiling (c) executing (d) Storing

20. An OS that allows only a single user to perform a task at a time is called as ……………….

(a) Single user os (b) Single task os **(c) Both a & b** (d) Multi tasking os

21. Identify the single user and single task OS?

(a) MS – DOS (b) UNIX (c) LINUX (d) iOS

22. Identify the multi-user OS?

(a) Windows (b) Linux (c) UNIX **(d) All of these**

23. To build a cheap computer, ………………. os is used.

(a) Windows **(b) Raspbion OS** (c) iOS (d) None of these

24. GUI stands for ……………….

(a) Geo User Interact (b) Global User Inter Change

(c) Graphical User Interface (d) Global User Interface

25. A ………………. is the unit of work or program in a computer.

(a) Process (b) Code (c) Concept (d) Log file

26. The operating system processes are executed by ……………….

(a) User code (b) System code (c) Task (d) Program

27. System level security is provided by ………………. in a multi user environment.

(a) Permission (b) execute **(c) Password** (d) Security code

28. NTFS is a ……………….

(a) game **(b) file management technique** (c) os (d) System level security

29. ………………. os is used to access shared data that resides in any machine around the world.

(a) Time sharing (b) fixed (c) MS – Dos **(d) distributed**

30. Unix was developed in the year ……………….

(a) 1970 (b) 1980 (c) 1990 (d) 1960

31. Unix was developed by?

(a) Ken Thompson (b) Dennis Ritchie **(c) Both a & b** (d) Ricki Mascitti

32. ………………. is a windows alternative open source operating system.

(a) React OS (b) Boss (c) Redhat (d) Fedora

33. Google has developed ………………. for wrist watches.

(a) Android wear (b) Android wrist (c) Android wrist watches (d) Android watches

34. Which among the following is not an android moblie open source versions?

(a) Dotnut (b) Froyo (c) Nougat (d) Alpha

(CHAPTER-5) (WORKING WITH TYPICAL OPERATING SYSTEMS)

1. Which of the following key combination is used to permanently delete a file or folder without sending to recycle bin?

(a) Shift and delete (b) Alt and delete (c) Tab and delete (d) Ctrl and delete

2. Which command is used to 'paste'?

(a) Edit→ Paste (b) view → Paste (c) File → Paste (d) All the above

3. The opening screen of window is called ---
(a) Desk **(b) Desk top** (c) Button (d) icon

4. Match the following
(1) Desk top (i) Documents (2) Icons (ii) Double click
(3) Standard icons (iii) Opening screen (4) Short – cut icons (iv) GUI
(a) (1)-(iii),(2)-(iv), (3)-(i),(4)-(ii) (b) (1)-(ii), (2)-(iv), (3)-(i), (4)-(iii)
(c) (1)-(i), (2)-(ii), (3)-(iii),(4)-(iv) (d) (1)-(iii), (2)-(i), (3)-(iv), (4)-(ii)

5. You can move to the desktop anytime by pressing the ----while working in any application.
(a) Win key +B **(b) Win key + D** (c) Win key +A (d) Ctrl +D

6. In which version start button was removed?
(a) Windows 10 **(b) Windows 8** (c) Windows NT (d) Windows 98

7. Which of the following operating system to introduced control panel?
(a) Windows 4 (b) Windows 3 **(c) Windows 2** (d) Windows 1

8. Which of the following is not correctly matched?
(a) Windows Me – 2000 (b) Windows XP- 2001 **(c) Windows 7 – 2007** (d) Windows 10 – 2015

9. ………………. is Open source Operating System for desktop and server.
(a) Windows series (b) Android (c) iOS **(d) Linux**

10. The most common way of opening a file or a Folder is to click on it.
(a) left (b) right **(c) double** (d) single

11. If you want to select multiple files or folders, use ……………….
(a) Ctrl + shift **(b) Ctrl + click** (c) shift + click (d) Ctrl + shift + click

12. is a special folder to keep the files or folders deleted by the user, which means you still have an opportunity to recover them.
(a) My computer (b) Documents **(c) Recycle bin** (d) Pictures

13. ………………. is one of the popular Open Source versions of the UNIX Operating System.
(a) Windows 7 (b) Windows 8 **(c) Linux** (d) Android

14. …. icon is equivalent to My Computer icon. From here, you can directly go to Desktop, Documents and so on.
(a) Files (b) Documents (c) Downloads (d) Computer

15. …. icon is the equivalent of Recycle bin of windows OS. All the deleted Files and Folders are moved here.
(a) Trash (b) Files (c) Online shopping (d) Libre Office Impress

16. The vertical bar of icons on the left side of the desktop is called the ………………..
(a) Search (b) Libre office calc **(c) Launcher** (d) Files

17. …. manages network connections, allowing you to connect to a wired or wireless network.
(a) Toolbar (b) Title bar (c) Session indicator **(d) Network indicator**

18. To permanently delete a file or folder (i.e. to avoid sending a file or folder to the Recycle Bin), hold down the SHIFT key, and press on the keyboard.
(a) restore **(b) delete** (c) send to (d) cut

19. Clock is available in ……………….
(a) system tray (b) Files (c) start (d) My documents

20. ………………. command should be typed in the Run dialog bar to open Calculator?
(a) Calculator **(b) Calc** (c) Arithmetic (d) Calculator open

21. The menu bar is present below the ……………….
(a) Task bar (b) Scroll bar **(c) Title bar** (d) Function bar

22. Which of the following OS bar plug and play feature ……………….
(a) Window XP **(b) Windows 98** (c) Windows 95 (d) Windows me

23. ………………. has the task for frequently used applications?
(a) Quick Launch Tool bar (b) Settings (c) My pc (d) This pc

24. The winkey combination used to display desktop is ……………….
(a) winkey + dt (b) winkey + T (c) winkey + alt + D **(d) winkey + D**

25. SSD stands for ……………….
(a) Solid State Devices (b) Simple Stage Driver
(c) Single State Drivers (d) Synchronized State Devices

26. The mouse pointer becomes …. when it is positioned over a border or a comer of a window.
(a) + (b) arrow (c) single headed arrow **(d) double headed arrow**

27. What is the name given to the document window to enter or type the text?
(a) Work space (b) Work Area (c) Typing Area (d) Space

28. ………………. enables alternate method of opening an application.
(a) Running (b) Searching **(c) Run** (d) Open

29. The disk drives mounted in the system can be seen by clicking ……………….
(a) Disk drive Icon (b) Drive Icon (c) Device Driver Icon **(d) My Computer Icon**

30. What is the name given to the rectangular area in an application or a document?
(a) Document **(b) Window** (c) Application (d) Desktop

31. Windows 10 was developed in the year ……………….
(a) 2009 (b) 2012 **(c) 2015** (d) 2018

32. The Rulers are used to set ……………….
(a) Orientations (b) Header (c) Footer **(d) Margins**

33. Which one of the following boots faster, mns apps faster compared to HDD.
(a) FDD (b) Cache **(c) SSD** (d) DVD

34. Which functional key is used to bring the focus on, the first menu of the menu bar?
(a) F5 **(b) F10** (c) F11 (d) F7

35. How many disk drive icon options are there?
(a) 2 (b) 3 (c) 4 **(d) 5**

36. Which one of the following is used to open search results dialog box?
(a) search **(b) See more results** (c) search more results (d) searching web

37. Which icon is used to check whether one system is connected to another system?
(a) Network (b) System (c) Control panel (d) Hard drive

38. The keyboard shortcut to save a file is ……………….
(a) alt + s **(b) Ctrl + s** (c) Ctrl + alt + s (d) winkey + s

39. Which command is used to create new folder?
(a) File → folder (b) File → New folder (c) New → folder **(d) File → New → folder**

40. Applications or files or folders are opened using related shortcut icons by ……………….
(a) Click and drag **(b) double click** (c) click (d) drag and drop

41. In windows 7, which option is used from file menu to quit an application?
(a) Exit **(b) Close** (c) Quit (d) Exit window

42. Which option is used to save the file?
(a) Ctrl + s (b) Save (c) File + save **(d) All the above**

43. Which is inbuilt Word Processor application to create and manipulate text documents?
(a) Word pad (b) MS – Word (c) Staroffice writer (d) Notepad

44. Which option is used to delete all files in the Recycle bin?
(a) Remove the Recycle bin **(b) Empty the Recycle bin**
(c) Clear the Recycle bin (d) Clean the Recycle bin

45. The search text box in the computer disk drive screen will appear at ……………….
(a) Bottom right comer **(b) Top left comer**
(c) Bottom left comer (d) Top right comer

46. Which key is used to access the menu's in the menu bar?
(a) shift (b) control **(c) alt** (d) Tab

47. Which one of the following is the open source for desktop and server?
(a) Linux (b) MS – DOS (c) BASIC (d) COBOL

48. Which mouse actions is used to display popup menu?
(a) right click (b) click (c) Double click (d) drag and drop

49. What is used to interact with windows by clicking icons?
(a) Mouse (b) Keyboard (c) Monitor (d) Printer

50. Which menu contains layout options?
(a) option (b) view **(c) organize** (d) Menu bar

51. Hardware settings is used in which option?
(a) Monitor **(b) Display** (c) Theme (d) My Computer

52. In Text entry settings En, Fr, Ku are ……………….
(a) Desktop Layouts **(b) Keyboard Layouts**
(c) Message Layouts (d) Data Entry Layouts

53. Which menu has the rename option?
(a) File (b) Edit (c) View (d) Window

54. How will you rename the file?
(a) Edit → Rename (b) press F2 (c) right click → rename **(d) All the above**

55. In which panel of disk drive window, the files and folders are displayed in tree like structures?

(a) Top (b) Centre **(c) Left** (d) Right

56. Delete option is present in which menu?

(a) File (b) Edit (c) View (d) Tools

57. Which option reboot the computer?

(a) Restart (b) Boot (c) Reboot (d) Reselect

58. Identify the menu item which is not present is the keyboard indicator menu?

(a) Character Map **(b) Keyboard Layout** (c) Keyboard Layout Chart (d) Text entry settings

59. There are ………………. types of indicators in the Menu bar.

(a) 5 **(b) 6** (c) 1 (d)8

60. How many ways of creating files are there is windows?

(a) 2 (b) 3 (c) 4 (d) 5

61. How many sets of scroll bars are there?

(a) 2 (b) 3 (c) 4 (d) 5

62. How many versions of windows 2000 are there?

(a) 2 (b) 3 **(c) 4** (d) 5

63. Which one of the following is used for high traffic computer networks in windows 2000?

(a) Professional (b) Server (c) Advanced server **(d) Data centre server**

64. How many types of Icons are there?

(a) 2 **(b) 3** (c) 4 (d) 5

65. What is the name given to the larger window?

(a) Work window (b) Document window **(c) Application window** (d) Desktop

66. Which symbol is used to indicate that sub menu is attached to this option?

(a) + **(b) ▷** (c) ☐ (d) ◁

67. What is the keyboard shortcut for Exit option?

(a) Ctrl + E (b) Alt + E **(c) Ctrl + Q** (d) Alt + Q

68. How many methods of Renaming file are there?

(a) 2 **(b) 3** (c) 4 (d) 5

69. Which one of the following is not a method of pasting the contents?

(a) Edit → paste (b) Ctrl + V **(c) alt + V** (d) Right click → paste

70. Which option is used as a part of installing new software or windows update?

(a) Lock **(b) Restart** (c) Sleep (d) Hibernate

71. Which option is found only on Laptop?

(a) Lock (b) Restart (c) Sleep **(d) Hibernate**

(CHAPTER-6) (SPECIFICATION AND ABSTRACTION)

1. Ignoring or hiding unnecessary details and modelling an entity only by its essential properties is known as ----.

(a) Specification **(b) Abstraction** (c) Composition (d) Decomposition

2. Which is specified by the properties of the given input and the relation between the input and the desired output.

(a) Specification (b) Statement **(c) algorithm** (d) Definition

3. Which are named boxes storing data?

(a) Control flow (b) Algorithm **(c) Variables** (d) Functions

4. There are --- important control flow statements

(a) 2 (b) 4 (c) 6 **(d) 3**

5. If i = 4 before the assignment i := i-1 after the assignment, the value of i is

(a) 5 (b) 4 **(c) 3** (d) 2

6. Which one of the following is an example of process?

(a) Braid the hair (b) Adding three numbers **(c) Cooking a dish** (d) Walk in the Road

7. Who was a Hungarian Mathematician?

(a) G. Polya (b) John Wiley (c) Krysia Broda (d) Steve Vickers

8. How many basic building blocks construct an algorithm?

(a) 3 **(b) 4** (c) 5 (d) 8

9. …………….. state the properties of the given input and the relation between the input and the output.

(a) Composition (b) Abstraction (c) Decomposition **(d) Specification**

10. ……….. how many control flow statement are there to alter the control flow depending on the state?

(a) 5 (b) 6 **(c) 3** (d) 8

11. What is the specification of the algorithm?
(a) divide (A + B) **(b) square – root (n)** (c) square – root (x) (d) adding (A, B)

12. ………………. statement is used to store a value in a variable.
(a) Assignment (b) Sequential control flow(c) Alternative control flow(d) Iterative

13. The data stored in a variable is also called a ……………….
(a) process (b) data **(c) value** (d) constant

14. Each part of algorithm is known as ……………….
(a) input **(b) function** (c) variable (d) program

15. ………………. is the left side of the assignment.
(a) variable (b) value **(c) operator** (d) all the above

16. If i: = 3 before the assignment, i: = i + 1 after the assignment ……………….
(a) 3 **(b) 4** (c) 5 (d) 0

17. If i: = 2 before the assignment, then i: = i * 3 after the assignment is ……………….
(a) 6 (b) 5 (c) 0 (d) 1

18. If i: = 10 before the assignment, then i: = i % 2 after the assignment
(a) 10 (b) 5 **(c) 0** (d) 1

19. If – – m, n = 22, 5 and m, n : = m + 3, n – 1 then the value of m and n are ……………….
(a) 25, 4 (b) 24,5 (c) 22, 5 (d) 23,21

20. Initially the values of P and C are 4 and 5 respectively – – P, C : = 4, 5 P : = CC : = P. Then find P and C
(a) 4 and 4 (b) 5 and 4 **(c) 5 and 5** (d) 4 and 5

21. What are the values of variable m and n after the assignments in line (1) and line (3)?
1. m, n : = 2, 5 2. – – m, n = ?, ? 3. m, n : = m + 3, n – 1 4. – – m, n = ?, ?
(a) 4, 5 **(b) 5, 4** (c) 5,5 (d) 4, 4

22. How many Algorithmic designing techniques are there?
(a) 2 (b) 3 **(c) 4** (d) 5

23. which one of the following is the assignment operator?
(a) = (b) = = (c) + = = (d) + +

24. which one of the following is the equality operator?
(a) = **(b) = =** (c) + + (d) – –

25. which one of the following is the comment line in algorithm?
(a) + + (b) 1 1 **(c) – –** (d) = =

26. Which one of the following statements are not executed the computers?
(a) Comment line (b) Header file (c) cin (d) cout

27. The values of the variables when the algorithm starts is ……………….
(a) stage **(b) initial stage** (c) initial state (d) starting state

28. The values of the variables when the algorithm finishes is ……………….
(a) final stage **(b) final state** (c) last stage (d) last state

29. Instructions of a computer are also known as ……………….
(a) commands **(b) statements** (c) Abstractions (d) Functions

30. Which one of the following is not a building block of algorithm
(a) data **(b) state** (c) variables (d) functions

31. Which are the named boxes used for storing data?
(a) data **(b) variables** (c) control flow (d) functions

32. The order of execution of statement is called :
(a) Composition (b) Functions **(c) Control flow** (d) Specifications

33. In which one of the control flow statements, if the condition is false, then alternative statement will be executed
(a) Sequential (b) iterative (c) selection **(d) alternative**

34. In which one of the following control flow, the statements are repeated until the condition becomes false
(a) Sequential **(b) iterative** (c) selection (d) alternative

35. If the statement are executed one after the other, then it is control flow.
(a) Sequential (b) iterative (c) selection (d) alternative

36. A is like a sub algorithm.
(a) function (b) data (c) variable (d) state

37. Which one of the following is not a techniques for designing algorithms?
(a) specifications (b) abstraction **(c) encapsulation** (d) composition

38. How many parts are there in specification is ………………..
(a) 2 **(b) 3** (c) 4 (d) 5

39. The first part of the specification is ………………..
(a) Input (b) Output (c) property of inputs **(d) The name of the algorithm and the inputs**

40. In multiple variable assignment statement, the number of variables and the number of expressions must
(a) differ at least by 1 (b) not equal to 1 (c) equal to 0 **(d) be equal**

41. Sequential, Alternative and Iterative comes under the classification of ……………….. :
(a) Building blocks of algorithm **(b) control flow statements**
(c) Algorithm design techniques (d) Abstraction

42. To execute in a computer, an algorithm must be expressed using the statement of ………………..
(a) Object code (b) Machine Language (c) Assembler **(d) Programming Languages**

43. If the variable already has a value, and you are assigning a new value, what will happen to the old variable?
(a) retained (b) added **(c) lost** (d) becomes 0

44. Identify the function name: square (A + B) ………………..
(a) A (b) B (c) A + B **(d) square**

45. The input and output are passed between an algorithm and the user through ………………..
(a) data (b) assignment (c) stage **(d) variables**

46. Match the following
1. Specifications –Hiding unnecessary details 2.Abstraction – Divides main algorithm into functions
3. Composition – Relation between input and output
4. Decomposition – An algorithm is composed of assignment and control flow statements.
(a) 3, 1, 4, 2 (b) 1,2, 3, 4 (c) 4,3,2, 1 (d) 4, 2, 3, 1

47. Which one of the following statements are used to annotate a program for the human readers?
(a) comments (b) state (c) variables (d) functions

48. In specification, the input and output can be written using ………………..
(a) English (b) Mathematical notation (c) Binary format **(d) Both a and b**

49. Which one of the following defines the rights and responsibilities of the designer and the user?
(a) Abstraction (b) Composition (c) Decomposition **(d) Specification**

50. Which one of the following is the most effective mental tool used for managing complexity?
(a) Specification **(b) Abstraction** (c) Composition (d) Decomposition

51. How will be the input and output passed between an algorithm and the user ………………..
(a) comments (b) Assignment **(c) Variable** (d) Functions

(CHAPTER-7) (COMPOSITION AND DECOMPOSITION)

1. After the assignment what values will be stored in the variables m ,n ?1) m,n: =10,5 2) m,n: =m+3,n-2 3) m,n: = ? **?**
(a) 3, 13 (b) 10, 13 **(c) 13,3** (d) 10,5

2. How many times the loop is iterated ---- M: =0 While (m<5) M:=m+1
(a) 10 (b) 4 **(c) 5** (d) 6

3. Which of the following notation is a mix of programming language like constraints and plain English?
(a) Flow chart **(b) Pseudo-code** (c) Algorithm (d) Structure

4. How many times the loop is iterated? i := 0 while i = 5 i := i + 1
(a) 4 (b) 5 **(c) 6** (d) 0

5. In flow chat --- boxes represent inputs given and outputs produced.
(a) Rectangle **(b) Parallelogram** (c) Diamond (d) Triangle

6. Which one of the following is odd?
(a) Python (b) C++ (c) C **(d) Ctrl + S**

7. ……………….. is a diagrammatic notation for representing algorithms.
(a) Pseudo code **(b) Flowchart** (c) Program (d) Languages

8. There are important control flow statements.
(a) four **(b) three** (c) two (d) five

9. A ……………….. statement is composed of a sequence of statements.
(a) iterative (b) conditional **(c) sequential** (d) alternative

10. A … is contained in a rectangular box with a single outgoing arrow, which points to the box to be executed next.
(a) statement (b) composition (c) notation (d) condition

11. The triangle is right – angled, if ………………..
(a) C = a – b **(b) $C^2 = a^2 + b^2$** (c) $C^2 = (a + b)^2$ (d) $c^2 = a^2 - b^2$

12. The algorithm can be specified as ……………….
(a) monochromatize (a, b, c) (b) a = b = 0 (c) C = A + B + C (d) none

13. After an algorithmic problem is decomposed into sub problems, we can abstract the sub problems as
(a) refinement (b) pseudo – code (c) decomposition **(d) functions**

14. Which one of the following is the elementary problem solving techniques?
(a) Specification (b) Abstraction (c) Composition **(d) decomposition**

15. Which one of the following have only high level details?
(a) Flow chart **(b) Algorithm** (c) Programs (d) Pseudocode

16. How many different notations are there for representing algorithms?
(a) 2 **(b) 3** (c) 4 (d) 5

17. Which one of the following notations will be executed by computers?
(a) Flow chart (b) Pseudocode **(c) Programming languages** (d) Compiler

18. Which one of the following algorithmic notation is used for communication among people?
(a) Flow chart **(b) Pseudo code** (c) PL (d) Interpreter

19. Which one of the following algorithmic notation is used for giving visual intuition of control flow?
(a) Flow chart (b) Programming languages (c) Pseudo code (d) Compiler

20. The algorithmic notation similar to Programming language is ……………….
(a) Flow chart **(b) Pseudo code** (c) C ++ (d) C

21. Which one is used for converting programs into computer executable instructions?
(a) Converter (b) Apps **(c) Translator** (d) exe files

22. The notation which is not formal nor exact is ……………….
(a) Flow chart **(b) Pseudo code** (c) Compiler (d) Translator

23. Find the pair which is wrongly matched.
(a) Rectangular boxes – Statements **(b) Diamond boxes – Output**
(c) Arrow – Control flow (d) Parallelogram – Input

24. The inputs and outputs are drawn using ……………….. boxes.
(a) rectangular (b) diamond **(c) Parallelogram** (d) Oval

25. The symbol used for representing the box to be executed next is ………………..
(a) ⇒ (b) ⇓ **(c) ↓** (d) ++

26. The flow of control is represented in the flowchart by ………………..
(a) arrow (b) dot (c) box (d) plus

27. In flow chart, rectangular boxes represents ………………..
(a) statements (b) condition (c) Input (d) End

28. A condition is contained in a diamond shaped box with ……………….. outgoing arrows.
(a) 2 (b) 3 (c) 4 (d) 5

29. A collection of boxes containing statements and conditions connected by arrow are ………………..
(a) compiler **(b) Flow chart** (c) Pseudo code (d) Algorithm

30. How many outgoing arrows are needed for rectangular boxes in flow chart?
(a) 0 **(b) 1** (c) 2 (d) 3

31. Statements composed of other statements are known as:
(a) Simple Statements **(b) Compound Statements** (c) Conditional (d) Control flow

32. Which one of the following is not a control flow statements?
(a) Sequential **(b) Assignment** (c) Iterative (d) Alternative

33. Which one of the following statement is used to alter the normal flow of control of the program?
(a) Assignments (b) Control flow (c) Compound **(d) both b & c**

34. Which one of the following statements are executed one after the other as written in the algorithm?
(a) Sequential (b) Iterative (c) Conditional (d) Decisive

35. Alternative statements analyses the problem into ……………….. cases.
(a) 2 (b) 3 (c) 4 (d) 5

36. Case analysis statement generalizes the statement into ……………….. cases.
(a) 2 (b) 3 (c) 5 **(d) multiple**

37. If $_{s}^{C}$ is a ……………….. statement.
(a) Conditional (b) Alternative (c) Case Analysis (d) Iterative

38. Which one of the following process executes the same action repeatedly?
(a) Conditional (b) Alternative **(c) Iterative** (d) None of these

39. The iterative statement is commonly known as a ………………..
(a) loop (b) Case Analysis (c) Alternative (d) Conditional

40. Testing the loop condition and executing the loop body once is called ………………..
(a) alternative (b) conditional **(c) Iteration** (d) Decomposition

(CHAPTER-8) (ITERATION AND RECURSION)

1. The unchanging property of a variable in iteration is known as:
(a) Recursion **(b) Loop invariant** (c) Assignment (d) Condition

2. Iterative statement repeatedly evaluates a condition till the condition is ----
(a) True (b) False (c) Both (d) None of these

3. Which is the key to construct and reason about iterative algorithms?
(a) Loop invariant (b) Composition (c) Base Case (d) Decomposition

4. ………………… is an algorithm design technique, closely related to induction.
(a) Iteration (b) Invariant (c) Loop invariant **(d) Recursion**

5. In which year E W Dijkstra was awarded ACM Turing Award?
(a) 1972 (b) 1974 (c) 1970 (d) 1911

6. In a loop, if L is an invariant of the loop body B, then L is known as a …………………
(a) recursion (b) variant **(c) loop invariant** (d) algorithm

7. Recursion must have at least ………………… base case.
(a) one (b) two (c) three (d) four

8. The unchanged variables of the loop body is …………………
(a) loop invariant (b) loop variant (c) condition (d) loop variable

9. ………………… is the algorithm design techniques to execute the same action repeatedly.
(a) Iteration (b) Recursion **(c) Both a & b** (d) none of these

10. If L is a loop variant, then it should be true at ………………… important points in the algorithm.
(a) 2 (b) 3 **(c) 4** (d) 5

11. The loop invariant need not be true at the …………………
(a) Start of the loop (b) end of the loop (c) end of each iteration **(d) middle of algorithm**

12. In an expression if the variables has the same value before and after an assignment, then it is of an assignment.
(a) variant **(b) Invariant** (c) iteration (d) variable

13. The input size to a sub problem is than the input size to the original problem.
(a) equal **(b) smaller** (c) greater (d) no criteria

14. When the solver calls a sub solver, then it is called …………………
(a) Iterative call (b) solver call **(c) recursive call** (d) conditional call

15. How many cases are needed for a recursive solvers?
(a) 2 (b) 3 (c) 4 (d) 5

16. Which of the following is updated when each time the loop body is executed?
(a) data type (b) subprogram (c) function **(d) variable**

17. Which is the key to construct iterative algorithm …………………
(a) loop invariant (b) Variable (c) loop (d) Recursive

(CHAPTER-9 PART-1 &2) (INTRODUCTION TO C++) & (DATA TYPES, VARIABLES AND EXPRESSIONS)

1. Which of the following operator is received from operator of C++?
(a) >> **(b) <<** (c) <> (d) ^^

2. Which of the following is user defined data type?
(a) Char **(b) class** (c) float (d) int

3. Which can be used as alternate to \n?
(a) \t (b) \a **(c) end l** (d) \o

4. How many modifiers in C++?
(a) 4 (b) 5 (c) 2 (d) 3

5. Find the odd one out:
(a) Num1 (b) sum (c) value **(d) auto**

6. Which of the following statements is not true?
(a) C++ is a highly portable language **(b) C++ has not a function library**
(c) Multi-device and platform language (d) C++ is on OOP language

7. How many categories of data types available in C++?
(a) 5 (b) 4 **(c) 3** (d) 2

PREPARED BY… B.MOHAMED YOUSUF M.C.A.., B.Ed., (PG ASST IN COMPUTER SCIENCE)
[yousufaslan5855@gmail.com]

8. Which of the following data types is not a fundamental type?

(a) signed (b) int (c) float (d) char

9. What will be the result of following statement? char ch= ‘B’; cout<< (int) ch;

(a) B (b) b (c) 65 **(d) 66**

10. Which of the character is used as suffix to indicate a floating point value?

(a) F (b) C (c) L (d) D

11. How many bytes of memory allocates for the following variable declaration if you are using Dev C++? short int x;

(a) 2 (b) 4 (c) 6 (d) 8

12. What is the output of the following snippet? charch =‘A’; ch = ch + 1;

(a) B (b) A1 (c) F (d) 1A

13. Which of the following is not a data type modifier?

(a) signed **(b) int** (c) long (d) short

14. Which of the following operator returns the size of the data type?

(a) sizeof() (b) int () (c) long () (d) double ()

15. Which operator is used to access reference of a variable?

(a) $ (b) # **(c) &** (d) !

16. This can be used as alternate to endl command:

(a) \t (b) \b (a) \0 **(d) \n**

17. The latest standard version published in December 2017 as ISO/IEC .. which is informally known as C++ 17.

(a) 14882 : 1998 (b) 14883 : 2017 **(c) 14882 : 2017** (d) 14882 : 2000

18. The smallest individual unit in a program is known as ……………..

(a) token (b) lexical unit (c) lexical element **(d) all the above**

19. Integer constant is also called as ……………..

(a) fixed point constant (b) floating point constant (c) real constants (d) boolean literals

20. Exponent form of real constants consists of parts.

(a) 3 **(b) 2** (c) 5 (d) 4

21. …………….. relational operators are binary operators.

(a) 7 (b) 8 **(c) 6** (d) 2

22. …………….. used to label a statement.

(a) colon (b) comma (c) semi – colon (d) parenthesis

23. IDE stands for ……………..

(a) Integrated Development Environment (b) International Development Environment

(c) Integrated Digital Environment (d) None of the above

24. In programming language …………….. are referred as variables and the values are referred to as data.

(a) constant (b) integer **(c) fields** (d) files

25. …………….. data type signed more precision fractional value.

(a) char (b) short **(c) long double** (d) signed doubles

26. Syntax for reference is ……………..

(a) = (b) = <& reference> **(c) <&reference_variable**>= (d) None of these

27. …………….. manipulator is the member of iomanip header file.

(a) setw (b) setfill (c) setf **(d) all the above**

28. …………….. is used to set the number of decimal places to be displayed.

(a) Set precision (b) Garbage (c) Constant (d) All the above

(CHAPTER-10) (FLOW OF CONTROL)

1. #include<iostream> using namespace std int main() { int i, sum=5; for(i=1;i<=5;i++) { sum=sum+i} cout<<sum; return 0;} The output for the following snippet is:

(a) 20 (b) 10 (c) 25 (d) 15

2. Which of the following statement is used to terminate the execution of the loop -----

(a)While (b) go to **(c) break** (d) continue

3. How many times the following loop will execute? for (int i=1; i<10; i++)

(a) 11 **(b) 9** (c) 0 (d) 10

4. Which is not a jump statements in C++?

(a) Break (b) go to **(c) Switch** (d) continue

5. The—statement is a control statement, which is used to transfer the control from one place to another place without any condition in a program.
   (a) Break (b) **go to** (c) Continue (d) Switch
6. The empty statement is otherwise called as ………………..
   (a) Control statement (b) Zero statement (c) **Null statement** (d) Block statement
7. Selection statement is also called as ………………..
   (a) **Decision statement** (b) Sequence statement (c) Null statement (d) Compound
8. Iteration statement is called as ………………..
   (a) Null statement (b) Block statement (c) Selection statement (d) **Looping statement**
9. In C++ any non – zero is iterated as true ……………….. and zero is treated as false.
   (a) positive numbers (b) **negative numbers** (c) prime numbers (d) none of these
10. ……………….. is a multi – path decision making statement.
    (a) if (b) if – else (c) else – if (d) **if – else ladder**
11. Syntax of the conditional operator is ………………..
    (a) **expression 1? expression 2: expression 3** (b) expression 1: expression 2
    (c) expression 1! expression 2: expression 3 (d) expression 1: expression 2: expression
12. ……………….. is more efficient than if-else statement.
    (a) Control statement (b) **Switch statement** (c) Empty statement (d) Null statement
13. When a switch is a part of the statement sequence of another switch, then it is called as
    (a) if – else ladder (b) Switch statement (c) **Nested switch** (d) Empty statement
14. C++ supports types of iteration statements.
    (a) **3** (b) 2 (c) 4 (d) 5
15. Every loop has ……………….. elements that are used for different purposes.
    (a) 3 (b) **4** (c) 5 (d) 2
16. .. is used to transfer the control from one place to another place without any condition in a program.
    (a) Break statement (b) Continue statement (c) **goto statement** (d) All the above

(CHAPTER-11) (FUNCTIONS)

1. From where programming function process could be start?
   (a) isalpha () (b) isdigit () (c) islower () (d) **main ()**
2. The Pow() function takes two arguments has --- and ---
   (a) **Base- exponent** (b) base- radians (c) exponent – radians (d) base – negative
3. ……………… is the name of the function.
   (a) Pre – defined (b) Built – in (c) Library (d) **All the above**
4. ……………… is used to check whether the given character is an alphabet or not.
   (a) isalnum() (b) **isalpha()** (c) isalph() (d) isal()
5. The strcpy() function takes two arguments of ………………
   (a) **target and source** (b) upper and lower (c) base and exponent (d) none of these
6. ……………… takes a null terminated byte string source as its argument and returns its length.
   (a) strcpy() (b) **strlen()** (c) strcmp() (d) strcat()
7. The pow() function takes the two arguments of ………………
   (a) target and source (b) upper and lower (c) **base and exponent** (d) source and exponent
8. ……………… is the name of the function.
   (a) fact (b) task (c) arguments (d) **none of these**
9. The C++ program always have main() function to begin the program execution.
   (a) **1** (b) 2 (c) 3 (d) null
10. Arguments are also called as ………………
    (a) variable (b) constant (c) function (d) **parameters**
11. In C++ the arguments can be passed to a function in ……………… ways.
    (a) **2** (b) 1 (c) 3 (d) 7
12. Inline functions execute faster but requires more ………………
    (a) variables (b) pointers (c) **memory** (d) functions

(CHAPTER-12) (ARRAYS AND STRUCTURES)

1. Array subscripts is always starts with which number?
   (a) -1 (b) 2 (c) 0 (d) 3

2. Which keyword is used to create structure in C++?
(a) struct (b) structure (c) void (d) const

3. The data elements in the structure are also known as ………………..
(a) objects (b) members (c) data (d) records

4. Structure definition is terminated by
(a) : (b) } **(c) ;** (d) ::

5. 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

6. 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**

7. 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;};**

8. 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;

9. Which of the following cannot be a structure member?
(a) Another structure **(b) Function** (c) Array (d) variable of double

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

11. The size of the array is referred to as its ………………..
(a) dimension (b) direction (c) location (d) space

12. The subscript in bracket can be a variable, a constant or an expression to ………………..
(a) character **(b) integer** (c) long double (d) float

13. Displaying all the elements in an array is an example of ………………..
(a) memory allocation (b) call by reference **(c) traversal** (d) none of these

14. Syntax of character array declaration is ………………..
(a) int array char name [size]; (b) char array [ ]; (c) char_name[size]; **(d) char array – name[size];**

15. During ……………….. the array of elements cannot be initialized more than its size.
(a) declaration **(b) initialization** (c) assigning (d) execution

16. 2 – D array memory representation have ……………….. types.
(a) 2 (b) 3 (c) 4 (d) only

17. Pass an array to a function in C++, the function needs the array name as ………………..
(a) a function **(b) an argument** (c) global object (d) string

18. Objects declared along with structure definition are called ………………..
(a) structure (b) nested structure **(c) global objects** (d) memory

19. A structure without a name tag is called ………………..
(a) homogenous structure **(b) anonymous structure** (c) array of structure (d) dynamic memory

20. Array of structure is declared in the same way as declaring an array with ………………..
(a) built – in data type (b) data type (c) undefined (d) none of these

(CHAPTER-13) (INTRODUCTION TO OBJECT ORIENTED PROGRAMMING TECHNIQUES)

1. Which of the following is a technique of building new classes from an existing class?
(a) Inheritance (b) Abstraction (c) Encapsulation (d) Polymorphism

2. In procedural programming all data items are ………………
(a) Cobol **(b) global** (c) fortan (d) class

3. Class represents a group of similar ………………
(a) objects (b) modules (c) arrays (d) data

4. ……………… is an example of object oriented programming.
(a) Python (b) Java (c) VB.Net **(d) All the above**

5. ……………… refers to showing only the essential features without revealing background details.
(a) Redundancy (b) Encapsulation **(c) Abstraction** (d) Inheritance

6. ………………. is about binding the data variables and functions together in class.
(a) Data abstraction (b) Modularization (c) Redundancy **(d) Encapsulation**

(CHAPTER-14) (CLASSES AND OBJECTS)

1. The functions that perform specific tasks in a class is called:
(a) Inline functions (b) Data members **(c) Member functions** (d) Online functions

2. How many number of destructors can a class in C++ contain?
(a) 4 (b) 3 (c) 2 **(d) 1**

3. How many access specifies declared inside class definition?
(a) 3 (b) 2 (c) 4 (d) 1

4. Consider the following statements about destructors and choose the correct one.
(i) The destructors cannot have argument (ii) It has no return type (iii) They can be inherited
(a) (i), (ii), and (iii) **(b) (i) and (ii) only** (c) (i) and (iii) only (d) (ii) and (iii) only

5. The most important feature of C++ is ………………..
(a) object **(b) class** (c) public (d) All the above

6. Objects are also called as ………………..
(a) instance of class (b) class (c) function (d) scope

7. Calling a member function of an object is also known as ……………….. to object.
(a) call function (b) call by value (c) call by reference **(d) sending message**

8. Objects are passed as arguments to a ………………..
(a) call by value (b) call by reference **(c) member function** (d) global variable

9. When one class become the member of another class, the relationship is called ………………..
(a) containership (b) partnership (c) friendship (d) all the above

10. When a class is declared within another class, the inner class is called …….. and the outer class is called …
(a) enclosing class, nested class **(b) nested class, enclosing class**
(c) first class, second class (d) A class, B class

11. ……………….. can be defined either in private or in public section of a class.
(a) Object (b) Data type (c) Memory **(d) constructor**

12. A constructor which can take arguments is called ………………..
(a) parameterised constructor (b) default constructor
(c) copy constructor (d) destructor

13. There are ……………….. ways to create an object using parameterized constructor.
(a) 3 (b) 2 **(c) 1** (d) 4

14. The name of the symbol destructor is ………………..
(a) hash (b) arrow **(c) tilde** (d) bracket

(CHAPTER-15) (POLYMORPHISM)

1. Which one of the following C++ operator can be overloaded?
(a) + (b) ?: (c) :: (d) size of

2. The number and types of a function's parameters are called the …………………
(a) overload resolution **(b) function's signature** (c) function overloading (d) operator

3. The process of selecting the most appropriate overloaded function or operator is called …
(a) overload resolution (b) prototype (c) polymorphism (d) operator overload

4. The return type of overloaded functions are not considered for overloading same …………………
(a) polymorphism (b) prototype **(c) data type** (d) overloading

5. ………………… cannot have default arguments.
(a) Operator overloading **(b) Overloaded operators** (c) Function overloading (d) prototype

6. The mechanism of giving special meaning to an operator is known as …………………
(a) operator overloading (b) parameter (c) function overloading (d) polymorphism

7. Operator overloading provides new definitions for most of the ………………… operators.
(a) * (b) + = = (c) + **(d) C++**

8. The overloaded operator is given using the keyword ………….. followed by an operator symbol.
(a) operator (b) data type (c) object (d) function

(CHAPTER-16) (INHERITANCE)

1. How many types are there in heritance?
   (a) 5 (b) 4 (c) 3 (d) 2
2. When a derived class inherits only from one base class, it is known as ………………
   (a) multiple inheritances (b) multilevel (c) hierarchical **(d) single inheritance**
3. A class that inherits from a superclass is called ………………
   (a) derived class (b) superclass (c) base class (d) parent class
4. When more than one derived classes are created from a single base class, it is called ………………
   (a) inheritance (b) hybrid inheritance **(c) hierarchical** (d) multiple
5. ……………… pointer is a constant pointer that holds the memory address of the current object.
   (a) member function **(b) this pointer** (c) comma operator (d) data member
6. The ……………… are invoked in reverse order.
   (a) constructor **(b) destructor** (c) pointer (d) operator

(CHAPTER-17) (COMPUTER ETHICS AND CYBER SECURITY)

1. Stealing tiny amounts of money from each transaction is.
   (a) Fraud (b) Theft **(c) Salami slicing** (d) Spoofing
2. A moral code that is evaluated as right is ----
   (a) Piracy (b) viruses (c) cracking **(d) ethics**
3. ---is a crime where the criminals impersonate individuals for financial gain.
   (a) property-theft **(b) identity theft** (c) salami slicing (d) spoofing
4. Stealing data from a computer system without the knowledge or permission is called.
   (a) warez **(b) hacking** (c) cracking (d) Trojan
5. --- is the intermediary between the end users and a web browser.
   (a) firewall **(b) proxy server** (c) cookies (d) Wares
6. One of the most common virus is…
   (a) Ransom ware (b) Proxy server (c) hacking **(d) Trojan**
7. How many types of encryption?
   (a) 2 (b) 3 (c) 4 (d) 5
8. – is a type of software designed through which the criminals gain illegal access.
   (a) Malware (b) hacking (c) pharming (d) cookies
9. A moral code that is evaluated as right is ………………..
   (a) piracy (b) viruses (c) cracking **(d) ethics**
10. ……….. is a crime where the criminals impersonate individuals for financial gain.
    (a) intellectual property theft **(b) Identity theft** (c) Salami slicing (d) Spoofing
11. Stealing data from a computer system without the knowledge or permission is called ………………
    (a) warez **(b) hacking** (c) cracking (d) phishing
12. One of the most common virus is ………………..
    (a) Ransomware (b) Spyware (c) worms **(d) Trojan**
13. ……………….. is the intermediary between the end users and a web browser.
    (a) Firewall **(b) Proxy server** (c) Cookies (d) Warez

(CHAPTER-18) (TAMIL COMPUTING)

1. Which is not a search engine?
   (a) Android (b) Bing (c) Yahoo (d) Google
2. Which of the following is the first Tamil Programming language?
   (a) Kamban (b) Azhagi (c) Tamil Open Office **(d) Ezhil**
3. Which one of the following is Harass through online?
   (a) Cyber terrorism (b) Scam **(c) Cyber stalking** (d) Fraud
4. Human civilization developed with the innovation of computer in the ……………
   (a) 11th century (b) 13th century (c) 16th century **(d) 20th century**
5. …………… is not just a language, it is our identity, our life and our source.
   (a) English (b) Sanskrit **(c) Tamil** (d) Hindi
6. Getting government services through internet is known as ……………
   (a) e – library **(b) e – govemance**
   (c) Tamil programming language (d) Tamil translation applications

IMPORTANT SHORTCUT KEYS:

1.	Cut	-	**Ctrl+ X**
2.	Copy	-	**Ctrl+ C**
3.	Paste	-	**Ctrl+ V**
4.	Save	-	**Ctrl+ S**
5.	Close	-	**Ctrl+ W**
6.	Print	-	**Ctrl+ P**
7.	Undo	-	**Ctrl+ Z**
8.	Redo	-	**Ctrl+ Y**
9.	Refresh	-	**F5**
10.	Rename file	-	**F2**
11.	Help	-	**F1**
12.	Shutting Down	-	**Alt+F4**
13.	Find and Replace	-	**F5 (MS-Word)**
14.	Spelling mistake check	-	**F7**

IMPORTANT YEARS:

1.	Analytical engine	-1837
2.	First generation	-1940-1956
3.	Second ,,	- 1956-1964
4.	Third ,,	-1964-1971
5.	Fourth ,,	-1971-1980
6.	Fifth ,,	-1980 – till date
7.	Optical mouse invented	-1988
8.	Mechanical mouse	- 1968
9.	First computer monitor	-1973
10.	Mouse Patented	- 1970
11.	Mouse introduced	- 1960
12.	Microprocessor first intro	-1970
13.	Windows 1.x	- 1985
14.	Windows 2.x	-1987
15.	Windows 3.x	-1992
16.	Windows 95	-1995
17.	Windows 98	-1998
18.	Windows Me	-2000
19.	Windows 2000	-2000
20.	Windows XP	- 2001
21.	Windows Vista	-2006
22.	Windows 7	- 2009
23.	Windows 8	- 2012
24.	Windows 10	- 2015
25.	C++ names changes as	- 1983
26.	C++ Developed	- 1979
27.	"Object" has appeared	-1980
28.	Object Oriented features	-1990
29.	Unicode first version intro	-1991
30.	Tamil virtual academy	-2001
31.	Tamil language council	-2001
32.	Madurai project	- 1998
33.	Tamil Unicode started	-2004
34.	42% people using tamil Net	-2016
35.	72% people will access ,,	-2021

AUTHOR NAMES / ETC:

1.	Computer (AE Concept)	–	Charles Babbage (Father of computer)(1837)
2.	ENIAC	-	J.Presper Eckert / John Mauchly (1943-1946)
3.	Mouse	-	Douglas Engelbart (1960, Patented Nov 17,1970)
4.	First computer Monitor	-	Xerox Alto computer system (March 1, 1973)
5.	Boolean algebra	-	George Boole (1815-1864)
6.	Algorithm	-	G.Polya
7.	Iteration & Recursion	-	E.W Dijkstra (Program design)(1972 ACM award)
8.	C++	-	Bjarne Stroustrup (C++ developer)(1979)
		-	Rick Mascitti (Coined)(1983)
9.	Tamil Virtual University	-	17 Feb 2001 (Established TN Govt)(Tamil Virtual Academy)
10.	Unicode (Tamil)	-	First version (Oct-1991)
11.	Tamil language council	-	Singapore (2001) "Valar Tamil Iyakkam"
12.	Madurai Project	-	Lanch – 1998 ; Release – 2004
13.	Tamil Wikipedia	-	More than one lakh articles

ABBREVIATIONS

1.	**COMPUTER**	**–**	**Commonly Operating Machine Purposely Used for Technological and Educational Research**
2.	AE	–	Analytical Engine
3.	ENIAC	–	Electronic Numerical Integrator and Calculator
4.	EDVAC	–	Electronic Discrete Variable Automatic Computer
5.	UNIVAC	–	Universal Automatic Computer
6.	IBM	–	International Business Machines
7.	IC	–	Integrated Circuits
8.	VLSI	–	Very Large Scale Integrated Circuits
9.	ULSI	–	Ultra Large Scale Integration
10.	NLP	–	Natural Language Processing
11.	AI	–	Artificial Intelligence
12.	OCR	–	Optical Character Recognition / Reader
13.	OGR	–	Optical Grapheme Recognition
14.	IPO Cycle	–	Input Process Output Cycle
15.	CU	-	Control Unit
16.	ALU	–	Arithmetic and Logic Unit
17.	MU	–	Memory Unit
18.	QR	–	Quick Response
19.	CCD	–	Charge Coupled Device
20.	GUI	–	Graphical User Interface
21.	LCD	–	Liquid Crystal Display
22.	LED	–	Light Emitting Diodes
23.	CRT	-	Cathode Ray Tube
24.	VGA	–	Video Graphics Array
25.	CPS	–	Character Per Second
26.	DPI	–	Dots per Second
27.	PPM	–	Page per Minute
28.	OS	–	Operating System
29.	POST	–	Power On Self-Test
30.	BIOS	–	Basic Input Output System
31.	RUR	–	Rossum's Universal Robots.
32.	**BIT**	**–**	**Binary Digit**
33.	ASCII	–	American Standard Code for Information Interchange
34.	KB ; MB	-	Kilo Byte ; Mega Byte
35.	GB ; TB	-	Giga Byte ; Tera Byte
36.	PB ; EB	-	Peta Byte ; Exa Bye
37.	ZB ; YB	-	Zetta Byte ; Yotta Byte
38.	MSB	–	Most Significant Bit
39.	LSB	-	Least Significant Bit
40.	BCD	-	Binary Coded Decimal
41.	EBCDIC	-	Extended Binary Coded Decimal Interchange Code
42.	ISCII	-	Indian Standard Code for Information Interchange.
43.	X-OR	-	Exclusive-OR
44.	X-NOR	-	Exclusive-NOR
45.	**MHz & GHz**	**-**	**Mega Hertz & Giga Hertz**
46.	CPU	-	Central Processing Unit
47.	MDR	-	Memory Data Register
48.	MAR	-	Memory Address Register
49.	PC	-	Program Counter / Personal Computer
50.	RISC	-	Reduced Instruction Set Computers
51.	CISC	-	Complex Instruction Set Computers
52.	RAM	-	Random Access Memory
53.	ROM	-	Read Only Memory
54.	PROM	-	Programmable Read Only Memory

55.	EPROM	-	Erasable Programmable Read Only Memory
56.	EEPROM	-	Electrically Erasable Programmable Read Only Memory
57.	CD	-	Compact Disc
58.	DVD	-	Digital Versatile Disc or Digital Video Disc
59.	HD	-	High-Definition
60.	PDA	-	Personal Digital Assistance
61.	USB	-	Universal Serial Bus
62.	HDMI	-	High Definition Multimedia Interface
63.	VGA	-	Video Graphics Array
64.	SCSI	-	Small Computer System Interface
65.	**MS-Word**	**-**	**Micro Soft Word**
66.	UI	-	User Interface
67.	FIFO	-	First In First Out
68.	SJF	-	Shortest Job First
69.	RRS	-	Round Robin Scheduling
70.	FAT	-	File Allocation Table
71.	NTFS	-	Next Generation File System
72.	ios	-	iPhone Operating System
73.	**DOS**	**-**	**Disk Operating System**
74.	SSD	-	Solid State Drives
75.	CD-ROM	-	Compact Disc Read Only Memory
76.	**I/O Operator**	**-**	**Input and Output Operator**
77.	Cin	-	C-Input
78.	Cout	-	C-Output
79.	Int ; chr; var ; num	-	Integer ; Character ; Variables ; Number
80.	Const ; Str ; arr,struct	-	Constant ; String ; Array, Structure
81.	OOP	-	Object Oriented Programming
82.	AEIP (C++)	-	Abstraction Encapsulation Inheritance Polymorphism
83.	**MITM**	**-**	**Man-in-the-middle attack**
84.	EDI	-	Electronic Data Interchange
85.	CL or CSL	-	Cyber Law / Cyber Space Law
86.	ITL or IL	-	Information Technology Law / Internet Law
87.	HTTP	-	Hyper Text Transfer Protocol
88.	E-Commerce	-	Electronic Commerce
89.	IDS	-	Intrusion Detection Systems
90.	**IANA**	**-**	**Internet Assigned Numbers Authority**
91.	ICANN	-	Internet Corporation for Assigned Names and Numbers
92.	TSCII	-	Tamil Script Code for Information Interchange

CHAPTER 1 TO 18 16 LIST OUTS / TYPES / SUB HEADINGS

	CHAPTER – 1 INTRODUCTION TO COMPUTERS
1.	**Computer applications:** 1.Education, 2.Research, 3.Travel, 4.Tourism, 5.Weather forecasting, 6.Social networking, 7.E-commerce,8.Weather forecasting, 9.Booking airlines, 10.Railway
2.	**Computer Generations:** 1. First generation -1940- 1956 (VACCUM TUBES) 2. Second generation -1956-1964 (TRANSISTERS) 3. Third generation -1964-1971 (INTEGRATED CIRCUIT) 4. Fourth generation -1971-1980 (MICROPROCESSOR)(VLSI)) 5. Fifth generation -1980 to till date (ULTRA LARGE SCALE INTEGRATION) 6. Sixth generation - in future.
3.	**Computer Generation languages:** 1. First - Machine Language 2.Second - Assembly language 3.Third - High Level Languages 4. Sixth – Natural Language Processing
4.	**Computer Generation examples:** 1. First generation - ENIAC , EDVAC , UNIVAC 1 2.Second generation - IBM 1401, IBM 1620, UNIVAC 1108 3.Third generation - IBM 360 series, Honeywell 6000 series 4. Fourth generation – IBM and APPLE were developed
5.	**Computer Generation merits:** 1..Second – Batch processing and multi programming 2..Third - Smaller, faster, more reliable 3. Fourth– IBM,APPLE developed and portable computer introduced 4.Fifth- Introduced AI, Parallel processing 5.Sixth-Developemnt of robotics, Voice recognition s/w
6.	**Computer components:** 1) Hardware 2) Software.
7.	**Hardware example:** 1) Motherboard, 2) Memory devices, 3) Monitor, 4) Keyboard
8.	**CPU components:** 1) Control unit, 2) Arithmetic and logic unit (ALU), 3) Memory unit.
9.	**Control Unit:** 1) CPU, 2) Memory, 3) I/O devices
10.	**Memory Unit Types:** **1)** Primary memory, 2) Secondary memory
11.	**Primary memory and secondary memory examples:** 1) Primary – Volatile –RAM, 2)Secondary – Non Volatile - Hard disk, CD-ROM and DVD ROM
12.	**Input Devices types:** 1.Keyboard, 2.Mouse, 3.Scenner 4.Finger print Scanner, 5.Track ball, 6.Retail Scanner, 7.Light pen 8.OCR, 9.Bar &QR Code, 10.Voice Input Systems 11.Digital Camera, 12.Touch Screen 13.Keyer.
13.	**Output devices types:** 1.Monitor, 2.Printer 3.Plotter, 4.Speakers, 5.Multimedia projectors
14.	**Keyboard types:** 1) Wired 2) Wireless, 3) Virtual
15.	**Character keys:** **1)** Letters, 2) Numbers, 3) Special characters
16.	**Keys Types:** 1) Character keys, 2) Modifier keys, 3) System 4) GUI keys, 5) Enter 6) Editing keys, 7) Function keys, 8) Navigation keys, 9) Numeric keypad 10) Lock keys.
17.	**Mouse Types:** 1) Mechanical Mouse, 2) Optical, Laser Mouse, 3) Air Mouse, 4) 3D Mouse, 5) Tactile Mouse, 6) Ergonomic Mouse 7) Gaming Mouse.
18.	**Mouse some actions:** 1.Move, 2.Click, 3.Double click, 4.Right click, 5.Drag and drop.
19.	**Touch screen usages:** 1. Computers, 2.Laptops, 3.Monitors, 3.Smart phones, 4.Tablets, 5.Cash registers, 6.Information Kiosks.
20.	**Monitor types:** 1. CRT (Cathode Ray Tube), 2.LCD (Liquid Crystal Display), 3.LED (Light Emitting Diodes).
21.	**Printer types:** 1.Impact Printers, 2.Non-Impact printers

22.	**Impact printers types:** 1) Dot matrix 2)Line matrix
23.	**Non-Impact Printers:** 1**)** Laser printers 2) Inkjet printers
24.	**Inkjet Printers use colour cartridges:** 1) Magenta, 2) Yellow, 3) Cyan
25.	**Speakers common places:** 1) Airlines, 2) Schools, 3) Banks, 4) Railway Stations, Etc
26.	**Multimedia Projectors:** 1) Meeting halls or in classrooms
27.	**What are the different types of booting process?** 1) Cold Booting, 2) Warm Booting
	CHAPTER – 2 (PART – 1) NUMBER SYSTEMS
1.	**Data Representation :** 1) Bit (0 or 1), 2) Nibble (4 bits), 3) Byte (8 bits), 4) KiloByte (1024 bytes), 5) MegaByte (1024 KB), 6) GigaByte (1024 MB), 7) TeraByte (1024 GB)
2.	**Computer memory:** 1.Decimal system, 1 Kilo -1000,(or) 10^3. 2.Binary system, 1 KiloByte - 1024 bytes (or) 2^{10}.
3.	**American Standard Code for Information Interchange:** 1) Binary value 0 and 127 is used to represent a specific character. 2) The ASCII value - 32 3) ASCII value of numeric 0 is 48. 4) Range of ASCII values for lower case alphabets is from 97 to 122 5) Range of ASCII values for the upper case alphabets is 65 to 90
4.	**Different types of Number System:** ❖ Binary – Base value : 2 (0,1) ❖ Octal – Base value : 8 (0,1,2,3,4,5,6,7) ❖ Decimal – Base value :10 (0,1,2,3,4,5,6,7,8,9) ❖ Hexa Decimal – Base value :16 (0,1,2,3,4,5,6,7,8,9 ,A,B,C,D,E,F)
5.	**Encoding systems:** 1) BCD – Binary Coded Decimal 2) Unicode 3) EBCDIC – Extended Binary Coded Decimal Interchange Code 4) ASCII – American Standard Code for Information Interchange 5) ISCII - Indian Standard Code for Information Interchange
6.	**Binary Representation for Signed Numbers:** Signed Magnitude representation 1) 1's Complement 2) 2's Complement
7.	**Signed Magnitude representation example:** 1) +43 or 43 is a positive number 2) – 43 is a negative number
	CHAPTER -2 (PART - 2) BOOLEAN ALGEBRA
1.	**Basic logical operations:** 1) AND, 2) OR, 3) NOT
2.	**Derived gates:** 1) NAND, 2) NOR, 3) XOR, 4) XNOR
3.	**Universal gates:** 1) NAND, 2) NOR
4.	**List out Boolean Algebra :** 1) Identity , 2) Complement , 3) Commutative ,4) Associative , 5) Distributive ,6) Null Element 7) Involution , 8) Idempotence , 9) Absorption , 10) 3rd Distributive ,11)De Morgan's
	CHAPTER – 3 COMPUTER ORGANIZATION
1.	**Microprocessor is made up of 3 main units:** 1) Arithmetic and Logic unit (ALU),2) Control unit, 3) Registers (Internal Memory)
2.	**Characteristics of Microprocessors:** 1) Clock speed ,2) Instruction set, 3) Word size
3.	**Clock speed is measured:** MHz (Mega Hertz) or in GHz (Giga Hertz).
4.	**Instruction set carries out the operations:** 1) Data transfer, 2) Arithmetic operations, 3) Logical operations, 4) Control flow,5)Input/output
5.	**Data communication between CPU and memory:** 1) Memory Data Register (MDR) 2) Memory Address Register (MAR) 3)Program Counter (PC)
6.	**Types of Microprocessors :1.**The width of data that can be processed**, 2.**The instruction set

7.	**Classification of Microprocessors based on the Data Width:** 1) 8-bit Microprocessor, 2) 16-bit 3) 32-bit 4) 64-bit Microprocessor
8.	**Classification of Microprocessors based on Instruction Set:** 1) Reduced Instruction Set Computers (RISC), 2) Complex Instruction Set Computers (CISC)
9.	**Examples of Reduced Instruction Set Computers (RISC):** 1) Pentium IV, 2) Intel P6, 3) AMD K6 and K7.
10.	**Examples of Complex Instruction Set Computers (CISC):** 1) Intel 386 & 486, 2) Pentium, Pentium II and III, 3) Motorola 68000.
11.	**Memory access types:** 1.Sequential access 2) Random access
12.	**Memory Hierarchy:** 1) Cache Memory 2) Main Memory 3) Hard Disk
13.	**Types of RAM:** 1) Dynamic RAM (DRAM) **2)** Static RAM (SRAM)
14.	**Secondary Storage Devices:** 1) Hard Disks, 2) Compact Disc (CD), 3) Digital Versatile Disc (DVD), 4) Flash Memory Devices, 5) Blu-Ray Disc.
15.	**Examples for Flash memories :** 1) Pen drives, 2) Memory cards etc.
16.	**Ports and Interfaces:** 1) Serial Port, 2) Parallel Port, 3) USB Ports, 4) USB 3.0, 5) VGA Connector, 6) Audio Plugs, 7) PS/2 Port, 8) SCSI Port
	CHAPTER – 4 THEORETICAL CONCEPTS OF OPERATING SYSTEM
1.	**Types of Software:** 1) Application Software 2) System Software
2.	**Application Software example:** 1) MS-word ,2) VLC player
3.	**System Software example:** 1) Operating System, 2) Language Processor
4.	**O.S controls:** 1) Disk drives, 2) Printers, 3. Electronic gadgets.
5.	**O.S used in Laptop and personal computers:** 1.Windows, 2.UNIX, 3.Linux. **Mobile devices:** 1.Android, 2. Ios .
6.	**Types of Operating System:** 1. Single user- M.S Dos 2.Multi user – Windows, Linux and UNIX
7.	**Key features of the Operating System:** 1. User Interface, 2.Memory Management, 3.Process management, 4.Security Management.
8.	**Algorithms are mainly used to allocate the job (process) to the processor:** 1. FIFO 2. SJF 3. Round Robin, 4. Based on Priority
9.	**Security management level:** 1) File access level, (2) System level,(3) Network level
10.	**File management techniques available:** 1. Next Generation File System (NTFS), 2. ext2(Linux).
11.	**Prominent OS :** 1.UNIX, 2. Microsoft Windows, 3.Linux, 4.Ios, 5.Android
	CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM
1.	**functions of Windows Operating System:** 1) Access applications - Word processing, Games, Spread sheets, Calculators. 2) Manage hardware - Printers, Scanners, Mouse, Digital cameras etc., 3) File Management Activities - Creating, Modifying, Saving, Deleting files and folders 4) Change computer settings - colour scheme, screen savers. 5) Load any new program.
2.	**Versions of Windows Operating System:**

Versions	Year	Specific features
Windows 1.x	1985	❖ Introduction of GUI in 16 - bit. processor ❖ Mouse was introduced as an input device.
Windows 2.x	1987	❖ Supports to minimize or maximize windows. ❖ Control panel feature was introduced
Windows 3.x	1992	❖ Introduced the concept of multitasking. ❖ Supported 256 colours
Windows NT	1993	❖ Designed to act as servers in network.
Windows 95	1995	❖ Introduced Start button, the taskbar, Windows Explorer and Start menu.

		❖ Introduced 32 - bit processor..
Windows 98	1998	❖ Internet Explorer with the Operating System. ❖ Plug and play feature was introduced.
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. <u>Four versions of Windows 2000 were released:</u> 1.Professional, 2.Server, 3.Advanced Server 4.Data Centre Server
Windows XP	2001	❖ Introduced 64-bit Processor. ❖ Improved Windows appearance with themes.
WindowsVista	2006	❖ Updated the look and feel of Windows.
Windows 7	2009	❖ Booting time was improved, ❖ Introduced Internet Explorer 8 ❖ Introduced new user interfaces like Aero Peek, pinning programs to taskbar, handwriting recognition etc.
Windows 8	2012	❖ Windows 8 is faster than previous versions of Windows. ❖ Start button was removed.
Windows 10	2015	❖ Start Button was added again. ❖ Multiple desktop.

3.	**Mouse actions:** 1) Click, 2) Right click, 3) Double- click, 4) Drag and Drop
4.	**Standard Icons:** 1) My Computer, 2) Documents 3) Recycle Bin.
5.	**Types of icon:** 1) Folder Icon, 2) Application Icon
6.	**Disk drive icons:** 1) Hard disk, 2) CD-ROM/DVD Drive, 3) Pen drive, 4) Network drives 5) Other removable storage such as mobile, smart phone, tablet etc.,
7.	**Elements of a window:** 1.Title Bar, 2.Menu Bar, 3.The Workspace, 4.Scroll bars, 5.Corners and borders
8.	**List out Title bar:** 1) Minimize, 2) Maximize, Close button
9.	**List out Scroll bars :** Horizontally or vertically
10.	**List out Task bar:** 1.Volume control, 2.Network, 3.Date and time etc.
	CHAPTER – 6 SPECIFICATION AND ABSTRACTION
1.	**Building Blocks of Algorithms:** 1.Data, 2.Variables,3.Control flow,4.Functions
2.	**List out Control flow :** 1.In sequential control flow, 2.In alternative control flow, 3.In iterative control flow
3.	**Algorithm Design Techniques :** 1. Specification, 2. Abstraction, 3. Composition, 4. Decomposition
	CHAPTER – 7 COMPOSITION AND DECOMPOSITION
1.	**Notations for Algorithms:** 1) A programming language, 2) Pseudo code , 3) Flowchart
2.	**Examples of programming languages :** 1) C, 2) C++, 3) Python
3.	**Flowcharts:** 1) A statement , 2) A condition , 3) Parallelogram boxes, 4) Special boxes
4.	**Control flow statements :** 1.Sequential, 2.Alternative,3.Iterative
	CHAPTER – 8 ITERATION AND RECURSION
1.	**Recursive solver has two cases:** 1) Base case , 2) Recursion step
2.	**Loop invariant :** 1.at the start of the loop (just before the loop), 2.at the start of each iteration (before loop body) 3.at the end of each iteration (after loop body) 4.at the end of the loop (just after the loop)

	CHAPTER – 9 (PART – 1) INTRODUCTION TO C++
1.	**Character set:** 1) Alphabets, 2) Numeric, 3) Special Characters, 4) White space, 5) Other characters
2.	**Lexical Units (Tokens):** 1.Keywords, 2.Identifiers, 3.Literals, 4.Operators, 5.Punctuators
3.	**List out keywords:** 1.asm, 2.auto, 3.break, 4.case, 5.catch, 6.using,7.char, 8.class, 9.cost, 10.continue, 11.default, 12.Name space, 13.delete, 14.do, 15.double, 16.else, 17.enum. 18.bal,19. extern, 20.float, 21.for, 22.friend, 23.goto, 24.Static_cast, 25.if, 26.inline, 27.int, 28.long, 29.new, 30.Const_cast 31.operator, 32.private, 33.protected, 34.public, 35.register, 36.Dynamic_cast, 37.return, 38.short, 39.signed, 40.sizeof 41.static, 42.true, 43.struct, 44.switch, 45.template, 46.this, 47.throw, 48.false, 49.try, 50.typedef, 51.union, 52.unsigned, 53.virtual, 54.void, 55. Volatile, 56.while.
4.	**Literals (Constants):** 1.Real Constants, 2.Boolean Constants,3.Character Constants, 4.String Literals
5.	**Numeric Constants:** 1.Integer Constants (or) Fixed point constants.2.Real constants (or) Floating point constants.
6.	**Integer Constants (or) Fixed point constants:** (i) Decimal, (ii) Octal, (iii) Hexadecimal.
7.	**Exponent form of real constants consists of two parts:** (1) Mantissa, (2) Exponent
8.	**Boolean Literals:** (True = 1 or false = 0).
9.	**Character constant:** 1.Valid character constants : ‘A’, ‘2’, ‘$’ 2.Invalid character constants : “A”
10.	**String Literals:** **1.**Valid string Literals : “A”, “Welcome” “1234” 2.Invalid String Literals : ‘Welcome’, ‘1234’
11.	**Operators:** (i) Unary Operators - Require only one operand (ii) Binary Operators - Require two operands (iii) Ternary Operators - Require three operands
12.	**C++ Binary Operators are classified as:** (1) Arithmetic,(2) Relational,(3) Logical,(4) Assignment ,(5) Conditional Operator
13.	**Other Operators:** 1.The Comma operator, 2.Size of, 3.Pointer, 4.Component selection, 5.Class member operators
14.	**Punctuators/ Separator :** 1) Curly braces { }, 2) Parenthesis ( ), 3) Square brackets [ ], 4) Semicolon ;Colon : , 5) Comments : //, /* */
15.	**Input operator examples:** 1) cin >> num;, 2) cin >>x >> y;
16.	**Output operator examples**: 1) cout << “The sum = “ << sum; 2) cout <<“\n The Area: “ <<3.14*r*r; 3) cout << a + b ;
17.	**Execution of C++ program:** (1) Creating Source code, (2) Saving source code with extension .cpp, (3) Compilation,(4) Execution
18.	**Types of Errors :** 1) Syntax Error,2) Semantic Error, 3) Run-time error.
	CHAPTER – 9 (PART – 2) DATA TYPES, VARIABLES AND EXPRESSIONS
1.	**C++ Data types:** (1) Fundamental data types, (2) User-defined data types, (3) Derived data types.
2.	**Fundamental Data types:** (1) int data type, (2) char data type, (3) float data type, (4) double data type, (5) void data type
3.	**Modifiers types:** (1) signed (2) unsigned (3) long (4) short
4.	**Variables:** R-value and L-value. 1) R-value is data stored in a memory location 2) L-value is the memory address in which the R-value is stored
5.	**Manipulators:** 1.endl, 2.setw, 3.setfill, 4.setprecision, 5.setf.
6.	**Expression:** (i) Constant, (ii) Integer, (iii) Floating, (iv) Relational(v) Logical, (vi) Bitwise, (vii) Pointer
7.	**Type Conversion:** (1) Implicit type conversion**,** (2) Explicit type conversion.

	CHAPTER – 10 FLOW OF CONTROL
1.	**Statements:** (i) Null statement, (ii) Compound statement
2.	**Control Statements:** 1.Sequence statement, 2.Selection statement, 3.Iteration statement
3.	**Selection statements:** 1.if, 2.if-else, 3.Nested if, 4.if -else-if ladder,5.The ?: Alternative to if- else, 6.Switch .
4.	**Nested if forms:** 1. If nested inside if part, 2. If nested inside else part,3. If nested inside both if part and else part
5.	**Iteration statements:** 1.for statement, 2.while statement, 3.do-while statement
6.	**Parts of a loop:** 1.Initialization expression, 2.Test expression, 3.Update expression, 4.The body of the loop
7.	**Jump statements :** 1.Goto statement, 2.Break statement, 3.Continue statement
	CHAPTER – 11 FUNCTIONS
1.	**Need for Functions:** 1. Divide and Conquer, 2. Reusability
2.	**Types of Functions:** 1. Pre-defined or Built-in or Library Functions, 2. User-defined Function.
3.	**Standard input/output (stdio.h):** 1.getchar(), 2.putchar(), 3.gets(), 4.puts() and etc.
4.	**Character functions (ctype.h):** 1) isalnum(), 2) isalpha(), 3) isdigit(), 4) islower() 5) isupper(), 6) toupper(), 7) tolower()

5.	**String manipulation (string.h):**
	1.strcpy(), 2.strlen(), 3.strcmp(), 4.strcat(), 5.strupr(), 6.strlwr()

6.	**Mathematical functions (math.h):** 1.cos() function, 2.sqrt() function, 3.sin() function, 4.pow() function
7.	**Methods of calling functions:** 1) Call by value Method 2) Call by reference or address Method 3) Inline function
8.	**Scope Rules of Variables:** 1.Local scope, 2.Function scope, 3.File scope, 4.Class scope.
	CHAPTER – 12 ARRAYS AND STRUCTURES
1.	**Arrays :** 1.One-dimensional arrays, 2.Two-dimensional arrays,3.Multi-dimensional arrays
	CHAPTER – 13 OBJECT ORIENTED PROGRAMMING TECHNIQUES
1.	**Procedural programming example:** 1) FORTRAN 2) COBOL
2.	**Modular programming example:** 1) Pascal, 2) C
3.	**Object Oriented Programming:** 1) Class, 2) Objects
4.	**The Object-Oriented Programming approach mainly encourages:** 1.Modularisation, 2.Software re-use
5.	**Main Features of Object Oriented Programming:** 1.Data Abstraction, 2.Encapsulation, 3.Modularity,4.Inheritance,5.Polymorphism
6.	**Advantages of OOP:** 1.Re-usability, 2.Redundancy,3.Easy Maintenance,4.Security
7.	**Disadvantages of OOP:** 1.Size,2.Effort,3.Speed
	CHAPTER – 14 CLASSES AND OBJECTS
1.	**List out four features commonly present in OOP languages:** 1.Abstraction, 2.Encapsulation, 3.Inheritance,4.Polymorphism.
2.	**The General Form of a class definition:** 1.Private 2.Protected 3.Public
3.	**Class Access Specifies :** 1.Public members 2.Private members 3.Proteced members
4.	**Defining methods of a class:** (1) Inside the class definition, (2) Outside the class definition
5.	**Objects can be created in two methods:** (1) Global object, (2) Local object

6.	**The main function of the constructor is** 1) To allocate memory space to the object and, 2) To initialize the data member of the class object
7.	**Types of constructors:** 1.Default, 2. Parameterized Constructors 3. Copy Constructors
8.	**A copy constructor can be called in meny ways:** 1) When an object is passed as a parameter to any of the member functions 2) When a member function returns an object 3) When an object is passed by reference to an instance of its own class
9.	**Two ways to create an object using parameterized constructor:** 1) Implicit call, 2) Explicit call
	CHAPTER – 15 POLYMORPHISM
1.	**Operator that are not overloaded are follows** 1.Scope operator (**::**) 2.Sizeof 3.Member selector (**.**) 4.Member pointer selector (✳)5.Ternary operator (**?:**)
	CHAPTER – 16 INHERITANCE
1.	**Types of Inheritance:** 1. Single, 2. Multiple, 3. Hierarchical,4. Multilevel, 5. Hybrid
2.	**Visibility mode:** 1.Private, 2.Protected, 3.Public
	CHAPTER – 17 COMPUTER ETHICS AND CYBER SECURITY
1.	**Types of cyber – crimes:** 1.PHISHING, 2.VIRUSES,3. HACKING, 4.PIRACY, 5.IDENTITY THEFTS, 6. PHARMING, **7.**ONLINE FINANCIAL TRANSACTIONS
2.	**ETHICS:** 1.Do not use pirated software,2.Do not use unauthorized user accounts 3.Do not steal others' passwords,,4.Do not hack
3.	**GUIDELINES OF ETHICS:** 1.Honesty, 2.Confidentiality, 3.Respect, 4.Professionalism, 5.Obey The Law, 6.Responsibility
4.	**Common ethical issues :** 1.Cybercrime, 2.Software Piracy 3.Unauthorized Access 4.Hacking 5.Use of computers to commit fraud 6.Sabotage in the form of viruses 7.Making false claims using computers
5.	**Computer Crime:** 1.Cyber Terrorism, 2.Cyber stalking, 3.Malware, 4.Denial of service attack, 5.Fraud, 6.Harvesting, 7.Identity theft, 8.Intellectual property theft, 9.Salami slicing, Scam, 10Spam, 11Spoofing
6.	**SOFTWARE PIRACY:** 1.Duplicating and selling copyrighted programs 2.Downloading software illegally through network
7.	**PHISHING:** 1.Users should always be cautious when opening emails or attachments 2.This can lead to fraud or identity theft
8.	**PHARMING:** 1.Users should always be cautious when redirected to a fake site. 2.This can lead to fraud or identity theft
	CHAPTER – 18 TAMIL COMPUTING
1.	**Searching facilities in Tamil:** 1) Google, 2) Bing
2.	**Familiar Tamil Keyboard Interface:** ❖ Familiar Tamil keyboard: 1) NHM Writer, 2) E-Kalappai 3) Lippikar ❖ Familiar Tamil keyboard layouts: 1) Sellinam 2) Ponmadal
3.	**Tamil Office Automation Applications :** 1) Microsoft Office, 2) Open Office etc.,
4.	**Tamil Information Interchange Coding Systems:** 1) TSCII (Tamil Script Code for Information Interchange) 2) ISCII (Indian Script Code for Information Interchange) 3.Unicode
5.	**Organisation and projects to develop Tamil:** 1) Tamil Virtual Academy 2) Tamil Language Council, Singapore 3) Madurai Project 4) Tamil Wikipedia

CHAPTER 1 TO 18 TWO MARK BOOK BACK & PUBLIC QUESTION WITH ANSWERS

CHAPTER – 1 INTRODUCTION TO COMPUTERS

1. What is a computer? [AUG-2022]

- ❖ It is an electronic device that processes the input according to the set of instructions provided to it and gives the desired output at a very fast rate.

2. Distinguish between data and information.

Data	Information
❖ Data is defined as an unprocessed collection of raw facts, suitable for communication, interpretation or processing.	❖ Information is a collection of facts from which conclusions may be drawn.
❖ It do not convey any meanings	❖ It conveys some meaning
❖ Ex: 16, ‘kavitha’, ‘C’	❖ Ex: Kavitha is 16 years old.

3. What are the components of a CPU? [S-2020]

1. Control unit, 2.Arithmetic and logic unit (ALU), 3.Memory unit.

4. What is the function of an ALU? [M-2020, J-2024]

- ❖ The ALU is a part of the CPU where various computing functions are performed on data.
- ❖ The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations.

5. Write the functions of control unit. [M-2023]

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

6. What is the function of memory?

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

7. Differentiate Input and output unit.

Input unit	Output unit
❖ Input unit is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.	❖ An Output Unit is any hardware component that conveys information to users in an understandable form
❖ Example: Keyboard, mouse, etc.	❖ Example: Monitor, Printer etc.

8. Distinguish Primary and Secondary memory. [M-2024]

Primary memory	Secondary memory
❖ The Primary Memory is used to temporarily store the programs ❖ It is volatile in nature	❖ The Secondary memory is used to store the data permanently. ❖ It is non-volatile in nature
❖ Ex : RAM	❖ Ex: Hard Disk, CD or DVD

1. Write short note on Impact printer [M-2019]

- ❖ Impact printers print with striking of hammers or pins on ribbon.
- ❖ These printers can print on multi-part by using mechanical pressure.
- ❖ Dot matrix printers and line printers are impact printers.

CHAPTER – 2 (PART – 1) NUMBER SYSTEMS

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.

Step 1: Convert given Decimal number into Binary

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

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

Example:

- ❖ The binary number equivalent to the decimal number 46 is 101110_2
- ❖ Convert to 8 bits 00101110_2
- ❖ 1’s complement value is 11010001_2

3. Convert $(46)_{10}$ into equivalent binary number. [AUG-2022]

```
2 46     LSB
2  23-0        (46)10  = (101110)2
2  11-1
2  5-1
2  2-1
   1-0     MSB
```

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

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

5. List the encoding systems for characters in memory. [J-2023]

1. BCD – Binary Coded Decimal 2. EBCDIC – Extended Binary Coded Decimal Interchange Code
3. ASCII – American Standard Code for Information Interchange 4. Unicode
5. ISCII – Indian Standard Code for Information Interchange.

1. Convert $(1324)_8$ into its equivalent decimal number. [M-2024]

Weight	512	64	8	1
Positional Notation	8^3	8^2	8^1	8^0
Given number	1	3	2	4

$(1265)_8$ = 512x1+64x3+8x2+1x4
= 512+192+16+4
$(1265)_8$ = $(724)_{10}$

2. Convert $(44)_{10}$ into Binary number [M-2022]

2 44 **LSB**
2 22-0 $(46)_{10}$ = **$(101100)_2$**
2 11-0
2 5-1
2 2-1
1-0 **MSB**

3. Write a short note on Hexadecimal number system [AUG-2022]

- ❖ A hexadecimal number is represented using base 16. Hexadecimal or Hex numbers are used as a shorthand form of binary sequence.
- ❖ The first 10 symbols are the same as in the decimal system, 0 to 9 and the remaining 6 symbols are taken from the first 6 letters of the alphabet sequence, A to F, where A represents 10, B is 11, C is 12, D is 13, E is 14 and F is 15.

4. Perform binary addition for the following: 15_{10}+20_{10} [M-2023]

2 15 2 20 15_{10} = 1111
2 7-1 2 10-0 20_{10} = 10100
2 3-1 2 5-0 15_{10}+20_{10} = **$(100011)_2$**
1- 1 2 2-1
1-0

5. 11.011_2 Binary to decimal equivalent [M-2020]

$(11)_2$ = 3 2^1 2^0 . 2^{-1} 2^{-2} 2^{-3} =3+ .(0x0.5+1x0.25+1x0.125)
(0 + 0.25 +0.125)
1 1 . 0 1 1 $(11.011)_2$ = $(3.375)_{10}$

CHAPTER -2 (PART – 2) BOOLEAN ALGEBRA

1. What is Boolean Algebra?

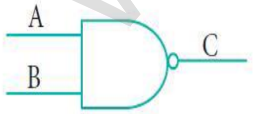
- ❖ Boolean algebra is used for designing digital circuits in a digital computer.
- ❖ It describes the relation between inputs and outputs of a digital circuit.
- ❖ Ex: **X=A+B**

2. Write a short note on NAND Gate.

NAND Gate:

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

The logical symbol of NAND gate is



The output of the NAND gate is

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

The truth table for NAND gate is

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

3. Draw the truth table for XOR gate.

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

4. Write the associative laws? 1. A + (B + C) = (A + B) + C 2. A . (B . C) = (A . B) . C **[J-2024]**

5. What are derived gates? [J-2019]

- ❖ The gates which are derived from the fundamental gates like, AND, OR, and NOT are called derived gates
- ❖ Ex: **NAND, NOR, XOR** and **XNOR** are derived gates.

CHAPTER – 3 COMPUTER ORGANIZATION

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

- ❖ 1.Clock speed 2.Instruction set 3.Word size

2. What is an instruction? [M-2019]

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

3. What is a program counter? [M-2019, J-2023]

- ❖ 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? [S-2020, J-2024]

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

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

- ❖ Ultra violet light is used to erase the content of a EPROM.

1. What is an instruction set? (AUG-2022)

- ❖ Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**.

CHAPTER – 4 THEORETICAL CONCEPTS OF OPERATING SYSTEM

1. List out any two uses of Operating System?

1. Easy interaction between the users and computers. 2. Controlling Input and Output Devices

3. Manage the utilisation of main memory. 4. Providing security to user programs

2. What is the multi-user Operating system? [M-2019, M-2024]

- ❖ 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? [J-2019, M-2023]

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

4. What are the security management features (levels) available in Operating System? [S-2020]

- ❖ (1) File access level (2) System level (3) Network level

5. What is multi-processing?

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

1.Single User Operating Systems
2.Multi-user Operating Systems
3.Multi-Processing Operating Systems
4.Distributed Operating Systems 5.Prominent operating systems

1. Name some popular operating system used in personal computer and mobile devices. (M-2022)

1.Personal computer O.S – Windows, Linux, Unix 2.Mobile O.S – Android, Ios

2. Define software and mention its types (AUG-2022)

- ❖ A software is set of instructions that perform specific task.
- ❖ It interacts basically with the hardware to generate the desired output.
- ❖ Software is classified into two types: 1) Application Software 2) System Software

CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM

1. What is known as Multitasking? [J-2024]

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

2. What are called standard icons? [M-2022, J-2023]

- ❖ 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. [AUG-2022]

Files	Folders
❖ A file is a collection of records	❖ Folder is a collection of files
❖ The files store data of any kind.	❖ The folders store files and other sub folders
❖ Each file has its own extension	❖ A folder does not have any extension.
Create a file: Start→All programs→Select applications→ok	**Create a folder:** Right click→New→Folder→ok

4. Differentiate Save and save As option.

Save	Save As
❖ Save option save a document in first time	❖ Save as option save an already save the document with a new name and also create a copy of already saved document with a new name obviously
❖ Shortcut key : Ctrl+S	❖ Shortcut key : Ctrl+Shift+S

5. How will you Rename a File?

1. Select the File or Folder you wish to Rename. 2. Click File→ Rename.
3. Type in the new name. 4. To finalise the renaming operation, press Enter as in Folder.

❖ There are two number of ways to rename files or folders

Rename,Using the File menu, Using Right mouse button, Using left mouse button.

CHAPTER – 6 SPECIFICATION AND ABSTRACTION

1. Define an algorithm. **[M-2022, M-2024]**

❖ An algorithm is a step-by-step sequence of statements / instructions to 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.	❖ A process is executing of instructions to accomplish the intended task [or] An instruction describes an action.
❖ As an algorithm is executed, a process evolves which solves the problem.	❖ When the instructions are executed, a process evolves which accomplishes the intended task or solves the given problem.
Example: Algorithm can be compared to a recipe.	**Example:** A process can compared to cooking.

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

1. – farmer, goat, grass, wolf = L, L, L, L
2. **farmer, goat := R, R**
3. – farmer , goat , grass , wolf = R, R, L, L
4. **farmer := L**
5. farmer, goat, grass, wolf = L, R, L, L
6. **farmer, grass := R, R**
7. – farmer , goat , grass , wolf = R, R, R, L
8. **farmer, goat := L, L**
9. – farmer, goat, grass, wolf = L, L, R, L
10. **farmer, wolf := R, R**
11. – farmer , goat , grass , wolf = R, L, R, R
12. **farmer : = L**
13. – farmer , goat , grass , wolf = L, L, R, R
14. **farmer , goat : = R, R**
15. – farmer , goat , grass , wolf = R, R, R,

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

❖ Minimum(A,B)

--inputs **:** A an B are integers (or) Real numbers

--Outputs : A is minimum (A<B)

B is minimum (B<A)

5. If $\sqrt{2}$ = 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 , $x \ge 0$ -- outputs: y is a real number such that $y^2=x$

❖ Yes. It violates the specification.

[For a positive input ($x \ge 0$), the output square root value should also be positive.

Here the functions returns -1.414 which is a negative value which is not possible as per output condition $y^2=x$]

1. What is abstraction? **(J-2023)**

❖ Ignoring or hiding unnecessary details and modelling an entity only by its essential properties is known as abstraction

2. What is difference between algorithm and a program? **(AUG-2022)**

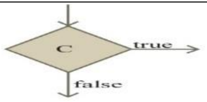
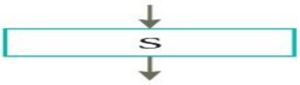
Algorithm: An algorithm is a sequence of instructions to accomplish a task or solve a problem.

Program: A set of instructions that directs a computer's hardware to perform a task.

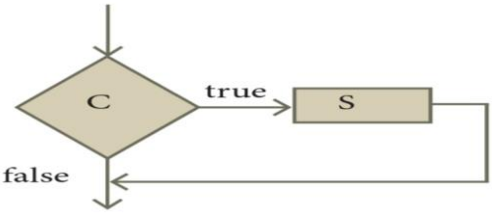
CHAPTER – 7 COMPOSITION AND DECOMPOSITION

1. Distinguish between a condition and a statement.

Condition	Statement
❖ A condition is contained in a diamond shaped box with two outgoing arrows, label true and false.	❖ A statement is contained in a rectangular box with a single outgoing arrow, which points to the box to be executed next.
❖ Condition is the checking process of either T/F	❖ Processing the condition

❖ Ex: a>b	❖ 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 statement. How do they differ?

Conditional statement	Iterative statement
❖ The condition 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.
❖ Example: If and If..else	❖ Example: While, Do While

4. What is the difference between an algorithm and a program? [AUG-2022]

Algorithm	Program
❖ Algorithm is a step by step procedure to solve a problem	❖ It is a set of instructions to solve a problem by the computer.
❖ An algorithm is a self-contained step-by-step set of operations to be performed to solve a specific problem	❖ A computer program is a sequence of instructions that complete the rules of a specific programming language, written to perform specific task with a computer.
❖ Method / Procedure of a program	❖ Computer Coding / Program
❖ No need to follow the grammar of a language	❖ Follow strictly the grammar of a programming language.

5. Why is function an abstraction?

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

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

6. How do we refine a statement?

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

CHAPTER – 8 ITERATION AND RECURSION

1. What is an invariant? [J-2023]

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

❖ An invariant is a condition that can be relied upon to be true during the execution of a program or during some portion of it.

2. Define a loop invariant. [M-2023]

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

❖ The property of the variables which remains unchanged by the execution of the loop body is called as loop invariant.

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

❖ No. The loop conditions do not affect the loop invariant.

❖ Because the loop invariant is true at four points.

i) at the start of the loop (just before the loop) ii) at the start of each iteration (before loop body)
iii) at the end of each iteration (after loop body iv) at the end of the loop (just after the loop)

4. What is the relationship between loop invariant, loop condition and the Input output recursively

Loop invariant	Loop condition
❖ A loop invariant is a condition that is necessarily true immediately before and immediately after each iteration of a loop.	❖ A loop invariant is some condition that holds for every iteration of the loop.

[OR]

❖ Establish the loop invariant at the start of the loop.

❖ The loop body should be update the variables 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?

❖ Recursion step breaks the problem into sub-problems of smaller size, assumes solutions for sub-problems are given by recursive calls, and constructs solution to the given problem.

❖ A loop invariant is some condition that holds for every iteration of the loop.

6. Define factorial of a natural number recursively.

❖ "The **factorial** of a **number** is the product of all the integers from 1 to that **number**."

```
 - - inputs : n is an integer, n ≥ D
- - outputs: fact  = n!
if n= 0 - - base case
        1
else
n*factorial (n-1) - -recursion step.
```

1. What is recursion? [M-2020]

❖ Recursion is another algorithm design technique, closely related to iteration, but more powerful.

❖ Using recursion, we solve a problem with a given input, by solving the same problem with a part of the input, and constructing a solution to the original problem from the solution to the partial input.

2. What is iteration? [S-2020]

❖ In iteration, the loop body is repeatedly executed as long as the loop condition is true. Each time the loop body is executed, the variables are updated.

❖ Iteration repeats the two steps of evaluating a condition and executing a statement, as long as the condition is true.

CHAPTER – 9 (PART – 1) INTRODUCTION TO C++

1. What is meant by a token? Name the token available in C++? [M-2023]

❖ The smallest individual unit in a program is known as a "**Token**" or "**Lexical unit**."

❖ C++ has the following tokens: 1.Keywords, 2. Identifiers, 3.Constants, 4.Operators, 5.Punctuators.

2. What are keywords? Can keywords be used as identifiers? [J-2019]

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

❖ No, Reserved words or keywords cannot be used as an identifier name.

3. The following constants are of which type?

(i) 39 - Integer constants **(ii) 032** - Octal constants

(iii) 0XCAFE - Hexadecimal constants **(iv) 04.1 4** - Floating Point constants

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

(a) 23.197 - 0.23197×10^2 **0.23197E02** **(c) 0.00005** - 0.5×10^{-4} **0.5E-04**

(b) 7.214 - 0.7214×10^1 **0.7214E01** **(d) 0.319** - 0.0319×10^1 **0.0319E01**

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

Answer: n++=n = 10+1 = 11

- -n; = n=1 = 10 – 1 = 9

6. Match the following

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

1. Write about Input / Output operators in C++ [AUG-2022]

❖ C++ provides the operator >> to get input. It extracts the value through the keyboard and assigns it to the variable on its right; hence, it is called as **"Stream extraction"** or **"get from"** operator.

❖ C++ provides << operator to perform output operation. The operator << is called the **"Stream insertion"** or **"put to"** operator.

2. Initially j is 20 and p is 4 then, What will be the value of p=p*++j? [M-2019]

Answer: p = 84

CHAPTER – 9 (PART – 2) DATA TYPES, VARIABLES AND EXPRESSIONS

1. Write a short note const keyword with an example. [M-2024]

❖ Const is the keyword used to declare a constant.

❖ Const are data items whose values do not change during the execution of the program.

❖ It is known as Access modifier.

Example: int num = 100;

Const int num = 100;

2. What is the use of setw () format manipulator? [J-2024]

❖ setw manipulator sets the **width of the field** assigned for the output.

❖ The field width determines the minimum number of characters to be written in output.

Syntax: setw (number of characters)

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

❖ Character data type accepts and returns all valid ASCII characters.

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

❖ If a variable is declared as char, C++ allows storing either a character or an integer value.

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

❖ A reference provides an alias for a previously defined variable. Declaration of a reference consists of base type and an **& (ampersand)** symbol;

Usage:

❖ Reference variable name is assigned the value of a previously declared variable.

Syntax: <type><& reference _variable>=<Original_variable>;

5. Consider the following C++ statement. Are they equivalent? Char ch = 67; char ch = ‘C’;

❖ Yes. They (ch=67, ch=‘C’) are equal. Both the statements are equivalent as they declare ‘ch’ to be char and initialize it with the value of 67.

❖ Since is the ASCII code for ‘C’, the character constant also can be used to initialize ‘ch’ to 67.

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

56 L	56
The suffix L forces the constant to be represented as long, which occupies 4 bytes.	This is will be represented as ini type constant which occupies 2 bytes as per Turbo C++

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

(i) 0.5 - Valid Floating Constant

(ii) ‘Name’ - Invalid String Constant (Enclosed within Double quotes)

(iii) ‘\t’ - Valid - Non graphic Character data type

(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 variable. Construct a C++ statement to do the above.

double x;
double y;
int z = (int) x + (int) y; **[OR]** int z = (int)(x+y);

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

(a) cout << num; → 6 **; (b) cout << (num==5);** → 0 (False)

10 Which of the following two statements are valid? Why? Also write their result. Int a; (i) a = 3,014; (ii) a=(3,014);

❖ Above the two statements is **Invalid.**

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

1. Write the output for the following: **[M-2023]**

#include<iostream>
using namespace std;
int main () { Double var1=87.25255; cout<<(float)var1<<end1; cout<<(int)var1<<end1; }

Output

```
87.2525
87
```

2. What is mean by type conversion? [S-2020]

❖ The process of converting one fundamental data type into another is called as “Type Conversion”.

❖ C++ provides two types of conversions. 1.Implicit type conversion 2.Explicit type conversion.

CHAPTER – 10 FLOW OF CONTROL

1. What is a null statement and compound statement? [M-2022 3M]

Null statement :

❖ The “null or empty statement” is a statement containing only a semicolon (;)

❖ Null statements are commonly used as placeholders in iteration statements or as statements on which to place labels at the end of compound statements or functions.

Ex: **;** // it is a null statement

Compound statement :

❖ C++ allows a group of statements enclosed by pair of braces {}.

❖ This group of statements is called as a compound statement or a block.

The general format:

```
{
statement1;
statement2;
statement3;
}
```

2. What is selection statement? Write its types.

❖ Selection statements and iteration statements are executed depending upon the conditional expression. The conditional expression evaluates either true or false.

❖ **Types:** 1)If, 2) if else,3) Nested if, 4) if-else-if ladder 5) Alternative to if-else(?:) 6) Switch

3. Correct the following code segment:

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

Answer: **(i) 2000 -** Leap **(ii) 2003 -** Not Leap Year **(iii) 2010 -** Not Leap Year

5. What is the output of the following code?

for (int i=2; i<=10 ; i+=2) cout << i; **Answer:** Output : 2 4 6 8 10

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

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

7. Write a while loop that displays numbers 2, 4, 6, 8…....20. [J-2024]

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

8. Compare an if and a ? : operator

if	?:
❖ The if statement evaluates a condition, if the condition is true then a true-block(a statement or set of statements) is executed, otherwise the true-block is skipped	❖ The conditional operator (or Ternary operator) is an alternative for 'if else statement'. ❖ The expression 1 is a condition which is evaluated, if the condition is true (Non-zero), then the control is transferred to expression 2, otherwise, the control passes to expression 3.

❖ Syntax: if (expression)
true-block;
statement-x;
	❖ Syntax:
	expression1? Expression2 :expression3

1. Write a while loop that displays numbers 5, 10, 15, …...50. [M-2019]

```
int i=5;
while (i<=50)
{
cout << i<<',' ;
i=i+5;
}
```

2. Write the syntax and example of if statement [M-2020]

Syntax:

```
if (expression)
      true-block;
statement-x;
```

Example :

```
#include <iostream>
using namespace std;
int main()
{
int age;
cout<< "\n Enter your age: ";
cin>> age;
if(age>=18)
cout<< "\n You are eligible for voting ….";
cout<< "This statement is always executed.";
return 0;
}
```

3. What are the important control flow statement [J-2019]

- ❖ Program statements that cause such jumps are called as "Control flow".
- ❖ The basics of control structures such as "Selection", "Iteration" and "Jump" statement.

4. for (int m=1;m<=9,M+=2) cout<<m; [S-2020]

1)How many times the loop will be executed? 8 times 2) Write the output of the above snippet. 1 to 10

5. **Convert the following if..else statement into conditional statement. [J-2023]**

if (marks > = 60) **Ans:** Grade = (marks>=60)?A:B;
Grade = 'A';
else
Grade = 'B';

6. **Write a note on break and continue statement in C++? [M-2020]**

Break:

- A break statement is a jump statement which terminates the execution of loop and the control is transferred to resume normal execution after the body of the loop.

Continue:

- The continue statement works quite similar to the break statement.
- Instead of terminating the loop (break statement), continue statement forces the loop to continue or execute the next iteration.

7. **Write the output of the following program. [M-2024]** **OUTPUT:** 0 1 2 3 4 5 6 7 (Write vertical order)

```
#include<iostram>
using namespace std;
int main()
{
int i;
for(i=0;i<8;i++)
cout<<i<<endl;
return 0;
}
```

CHAPTER – 11 FUNCTIONS

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.
- Functions reduce the size and complexity of a program, makes it easier to understand, test, and check for errors.

2. **Write about strlen () function. [S-2020, J-2023, J-2024]**

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

General form :

Strlen(string)

Ex:

name= "Tamil"
strlen(name); [**length of the name = 5]**

3. **What are importance of void data type? [M-2019, M-2020, M-2022, M-2024]**

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

4. **What is Parameter and list its types? [J-2019]**

- Arguments or parameters are the means to pass values from the calling function to the called function

1. The variables used in the function definition as parameters are known as **formal parameters.**
2. The constants, variables or expressions used in the function call are known as **actual parameters**

5. **Write a note on Local Scope.**

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

CHAPTER – 12 ARRAYS AND STRUCTURES

1. **What is Traversal in an Array?**

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

2. **What is Strings?**

- A string is defined as a sequence of characters where each character may be a letter, number or a symbol.
- Every string is terminated by a null ('\0', ASCII code 0) character which must be appended at the end of the string.

3. **What is the syntax to declare two – dimensional array. [M-2019, M-2022, J-2024]**

- The declaration of a 2-D array is : data-type array_name[row-size][col-size];

4. **Define structure .What is its use?**

- Structure is a user-defined which has the combination of data items with different data types.

Use:

- ❖ This allows to group of variables of mixed data types together into a single unit.
- ❖ The structure provides a facility to store different data types as a part of the same logical element in one memory chunk adjacent to each other.
- ❖ Structure is declared using the keyword 'struct'.

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

struct employee{ inteno;charename[20];char dept;} Employee e1,e2;

```
struct employee          i]  Structure not terminated with;
{                        ii] Structure tag should be in upper case
int eno;                 iii] Space between data type and variable
char ename[20];
char dept;
};
employee e1,e2;
```

1. How many elements are there in the following array declaration and also write its memory allocation. Char ch[15]; **[J-2019]**

Array declaration is: char array_name[size] Example: char your name[15];

- ❖ 15th element in the array.

CHAPTER – 13 OBJECT ORIENTED PROGRAMMING TECHNIQUES

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

Modular programming	Procedural Programming
❖ Modular programming consist of a list of instructions that instructs the computer to do something. ❖ But this Paradigm consists of multiple modules, each module has a set of functions of related types. ❖ Data is hidden under the modules. ❖ Arrangement of data can be changed only by modifying the module	❖ Procedural means a list of instructions were given to the computer to do something. ❖ Procedural programming aims more at procedures. This emphasis on doing things.

2. Differentiate classes and objects.

Classes	Objects
❖ A Class is a construct in C++ which is used to bind data and its associated function together into a single unit using the encapsulation concept.	❖ Represents data and its associated function together into a single unit. Objects are the basic unit of OOP.
❖ Class is a user defined data type. Class represents a group of similar objects.	❖ Basically an object is created from a class. They are instances of class also called as class variables

3. What is polymorphism? **[J-2019, M-2020, M-2023]**

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

4. How encapsulation and abstraction is are interrelated?

- ❖ The mechanism by which the data and functions are bound together into a single unit is known as Encapsulation
- ❖ Abstraction refers to showing only the essential features without revealing background details.

5. Write the disadvantages of OOP. **[M-2019]**

- ❖ **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.

1. What is a class in C++? **[S-2020, J-2023]**

1. Class is a user defined data type. 2. Class represents a group of similar objects.

CHAPTER – 14 CLASSES AND OBJECTS

1. What are called members? **[M-2019]**

- ❖ 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.
- ❖ Member functions are the functions that perform specific tasks in a class.

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

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

structure	class
❖ Members are by default public.	❖ Members are by default private
❖ Contains only data members	❖ Data members and member function

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

Class	Object
❖ A class is a template that represents a group of object that share common properties and relationship.	❖ An identifiable entity with some characteristics and behaviour is called object.
❖ Class is a way to bind the data and its associated function together.	❖ The class variables are called object or instance of clas
❖ **Ex:** Class Stud "Stud" is a class	❖ **Ex:** Stud s; "s" is a object of class Stud.

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

❖ To allocate memory space to the object and

❖ To initialize the data member of the class object.

5. Write down the importance of destructor. [J-2019]

❖ 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.

CHAPTER – 15 POLYMORPHISM

1. What is function overloading? [M-2022]

❖ 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. [J-2019, J-2024]

1. Scope operator (**::**) **2.**Sizeof **3.**Member selector (**.**)
4. Member pointer selector (*****) 5.Ternary operator (**?:**)

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

```
add :: add (int a)
{
  x = a;
 cout<<"\nParameterized constructor";
}
```

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

❖ No. The return type of a function do 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.

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

1. What is polymorphism? [M-2019, M-2020]

❖ The word polymorphism means many forms (poly – many, morph – shapes)

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

CHAPTER – 16 INHERITANCE

1. What is inheritance? [M-2023]

❖ The mechanism of deriving new class from an existing class in called in heritance.

❖ The technique of building new classes from an existing Class.

2. What is a base class?

❖ A class that is used as the basis for creating a new class is called a super class or base class.

❖ The class to be inherited is called base class or parent class.

3. Why derived class is called power packed class? [M-2022]

❖ The derived class inherits all the properties of the base 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:

❖ Inherits from multiple base classes (More than one parent)

Multilevel Inheritance:

❖ Inherits from only one base class (Only one parent)

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

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

CHAPTER – 17 COMPUTER ETHICS AND CYBER SECURITY

1. What is harvesting? [M-2019, AUG-2022]

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

2. What are Warez? [J-2023, M-2024]

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

3. Write a short note on cracking.

❖ Cracking" means trying to get into computer systems in order to steal, corrupt, or illegitimately view data.

	❖ Cracking is where someone edits a program source so that the code can be exploited or modified. ❖ A cracker is a malicious or criminal hacker.
4.	**Write two types of cyber-attacks.** 1. Phishing, 2.Pharming, 3.Malware, 4.Man in the middle.
5.	**What is a Cookie? [S-2020]** ❖ 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.
	CHAPTER – 18 TAMIL COMPUTING
1.	**List of the search engines supporting Tamil. [M-2020, M-2024]** 1.Google 2.Bing 3.Yahoo
2.	**What are the keyboard layouts used in Android?** ❖ Sellinam and Ponmadal – are familiar Tamil keyboard layouts that works on Android operating system in Smart phone using phonetics.
3.	**Write a short note about Tamil Programming Language.** ❖ Programming languages to develop software in computers and smart phones are available only in English. ❖ Based on Python programming language, the first Tamil programming language "Ezhil" (எழில்) is designed. ❖ With the help of this programming language, you can write simple programs in Tamil.
4.	**What TSCII? [M-2020, M-2022]** ❖ TSCII (Tamil Script Code for Information Interchange) is the first coding system to handle our Tamil language. ❖ 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 Tamil Nadu. ❖ Now, this organisation functioning with the name "Tamil Virtual Academy". ❖ It offers different courses regarding Tamil language, Culture, heritage etc., from kindergarten to under graduation level.

CHAPTER 1 TO 18 THREE MARK BOOK BACK & PUBLIC QUESTION WITH ANSWERS

CHAPTER – 1 INTRODUCTION TO COMPUTERS

1. What are the characteristics of a computer? **[M-2023]**

- 1. Speed, 2.Accuracy, 3.Reliability, 4.Diligence, 5.Multi Processing, 6.Memory.

1. Speed : Computers can work very fast
2. Accuracy : The degree of accuracy of computer is very high.
3. Memory : Computers have the ability to store and retrieve data

2. Write the applications of computer.

1. Business 2. Education 3. Marketing 4. Banking 5. Insurance
6. Communication 7. Health Care 8. Military 9. Engineering Design

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

- An input device is a hardware or peripheral device used to send data to a computer
- Input device is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.

Example:

1.Keyboard, 2.mouse, 3.Scanner, 4.Fingerprint scanner, 5.Track Ball, 6.Retinal Scanner, 7.Light pen etc.

4. Name any three output devices.

1. Monitor: Monitor is the most commonly used output device to display the information.
2. Printer: Printers are used to print the information on papers.
3. Plotter: Plotter is an output device that is used to produce graphical output on papers.

5. Differentiate optical and Laser mouse. **[M-2019]**

Optical mouse	Laser mouse
❖ Uses Light source	❖ Uses Laser Light
❖ It has 2 or 3 buttons	❖ It has as many as 12 buttons.
❖ Less sensitive	❖ Highly sensitive
❖ Less sensitive towards surface	❖ Highly sensitive and able to work on any hard surface.

6. Write short note on impact printer

- These printers print with striking of hammers or pins on ribbon.
- These printers can print on multi-part (using carbon papers) by using mechanical pressure.
- **For example,** Dot Matrix printers and Line matrix printers are impact printers.

7. Write the characteristics of sixth generation. **[M-2022]**

- 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.
- It provides the ability to develop the computer program to understand human language.

8. Write the significant features of monitor. (OR) Characteristics of monitor **[M-2024]**

- Monitor is the most commonly used output device to display the information.
- Pictures on a monitor are formed with picture elements called PIXELS.
- There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).

1. Differentiate – Cold and Warm booting. **[J-2023]**

Cold booting	Warm booting
When the system starts from initial state i.e. it is switched on, we call it cold booting or Hard Booting.	When the system restarts or when Reset button is pressed, we call it Warm Booting or Soft Booting. The system does not start from initial state and so all diagnostic tests need not be carried out in this case.
When the user presses the Power button, the instructions are read from the ROM to initiate the booting process.	The system does not start from initial state and so all diagnostic tests need not be carried out in this case. There are chances of data loss and system damage as the data might not have been stored properly.

CHAPTER – 2 (PART – 1) NUMBER SYSTEMS

1. What is radix of a number system? Give example. **[AUG-2022]**

- Each number system is uniquely identified by its **base value** or **radix**.
- Radix or base is the count of number of digits in each number system.
- Radix or base is the general idea behind positional numbering system.

Example: 1.Binary –Radix 2 $(1010)_2$ 2.Octal – Radix 8 $(457)_8$
3.Decimal- Radix 10 $(314)_{10}$ 4.hexa-Decimal – Radix 16 $(25F)_{16}$

2. Write note on binary number system. **[J-2023]**

- There are only **TWO DIGITS** in the Binary system, namely, **0 and 1.**
- The numbers in the binary system are represented to the base 2 and the positional multipliers are the powers of 2.
- The left most bit in the binary number is called as the **M**ost **S**ignificant **B**it (MSB) and it has the largest positional weight.
- The right most bit is the **L**east **S**ignificant **B**it (LSB) and has the smallest positional weight.

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

Step :1 (Decimal to Binary)

2 150 $(150)_{10}$ = **$(10010110)_2$**
2 75-0
2 37-1
2 18-1
2 9-0
2 4-1
2 2-0
1-0

Step :2 (Binary to Octal)

$(10010110)_2$ $(?)_8$
010 010 110 $(150)_{10}$ = **$(226)_8$**
2 2 6

4. **Write short note on ISCII.**

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

5. **Add a) $-22_{10}+15_{10}$ [J-2024]**

2 22
2 11-0
2 5-1
2 2-1
1-0

2 15
2 7-1
2 3-1
1-1

22 → $(10110)_2$ 15 → $(1111)_2$
8 bit → 00010110 8 bit → 00001111
1's → 11101001
2's → 11101010

-22							1	
1's	1	1	1	0	1	0	0	1
								1
2's	1	1	1	0	1	0	1	0

				1	1	1		
-22_{10}	1	1	1	0	1	0	1	0
15_{10}	0	0	0	0	1	1	1	1
+	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**1**

$23_{10}+12_{10}$ = -7_{10} = **(11111001)$_2$**

b) $20_{10}+25_{10}$ [J-2024]

2 20
2 10-0
2 5-0
2 2-1
1-0

2 25
2 12-1
2 6-0
2 3-0
1-1

20 → $(10100)_2$ 25 → $(11001)_2$
8 bit → 00010100 8 bit → 00011001

			1					
20_{10}	0	0	0	1	0	1	0	0
25_{10}	0	0	0	1	1	0	0	1
+	**0**	**0**	1	**0**	**1**	**1**	**0**	**1**

$20_{10}+25_{10}$ = 45_{10} = **(00101101)$_2$**

1. **Convert 340_{10} to its equivalent Binary, Octal and Hexadecimal [J-2019]**

Step :1 Decimal to binary

2 340 **$(340)_{10}$ = $(101010100)_2$**
2 170-0
2 85-0
2 42-1
2 21-0
2 10-1
2 5-0
2-1
1-0

Step :2 (Binary to Octal)

$(101010100)_2$ $(?)_8$
101 010 100 **$(340)_{10}$ = $(524)_8$**
5 2 4

Step : 3 (Binary to Hexadecimal)

$(101010100)_2$ $(?)_{16}$
0001 0101 0100 **$(340)_{10}$ = $(154)_{16}$**
1 5 4

2. **A) State whether the following numbers are valid or not. If invalid write reason.** **[S-2020]**

1) $(796)_8$ - Not valid (octal base value 0 to 7)

2) $(7GE)_{16}$ - Valid (Hexadecimal base value 0 to 9 & A to F)

3)$(1110)_2$ - Valid (Binary base value 0,1)

B) Write the number system for the following numbers.

1) $(926)_{10}$ - Decimal number system 2) $(ABC)_{16}$ - Hexadecimal number system 3) $(450)_8$ – Octal number system

3. **Convert the following into octal number into binary number.** **[J-2023]**

i) 6137	ii) 245	iii) 472
6 1 3 7	2 4 5	4 7 2
110 001 011 111	010 100 101	100 111 010
6127 = $(110001011111)_2$	**245 = $(010100101)_2$**	**472 = $(100111010)_2$**

CHAPTER – 2 (PART – 2) BOOLEAN ALGEBRA

1. **Write the truth table of fundamental gates.** **[M-2020]**

AND gate

Input		Output
A	**B**	**A.B**
0	0	**0**
0	1	**0**
1	0	**0**
1	1	**1**

OR gate

Input		Output
A	**B**	**A+B**
0	0	**0**
0	1	**1**
1	0	**1**
1	1	**1**

NOT gate

A	**$\overline{A}$**
0	1
1	0

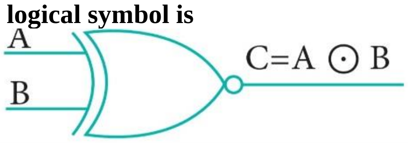
2. **Write a short note on XNOR gate.**

❖ The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter.

❖ Its output is "true" if the inputs are the same, and "false" if the inputs are different.

XNOR operation C = A ⊙ B

The logical symbol is



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

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

4. **Give the truth table of XOR gate.** **[M-2019, M-2024]**

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

5. **Write the De Morgan's law.** **[J-2024]**

1) $\overline{A+B} = \overline{A}.\overline{B}$ 2) $\overline{A.B} = \overline{A}+\overline{B}$

CHAPTER – 3 COMPUTER ORGANIZATION

1. **Differentiate Computer Organization from Computer Architecture.**

Computer Organization	**Computer Architecture**
❖ Computer organization deals with the hardware components of a computer system.	❖ Computer architecture also deals with how they are interconnected to implemented
❖ It deals with the hardware components that are transparent to the programmer.	❖ It deals with the engineering considerations involved in designing a computer.

2. **Classify the microprocessor based on the size of the data.** **[M-2022, J-2024]**

❖ 8-bit microprocessor 16-bit microprocessor 32-bit microprocessor and 64- bit.

3. **Write down the classifications of microprocessors based on the instruction set.** **[M-2023]**

❖ There are two types of microprocessors based on their instruction sets.

1) Reduced Instruction Set Computers (RISC) :

❖ Example: Pentium IV, Intel P6, AMD K6 and K7.

2) Complex Instruction Set Computers (CISC) :

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

4. **Differentiate PROM and EPROM.**

PROM	**EPROM**
Programmable read only memory is also a non-volatile memory.	Erasable Programmable Read Only Memory is a special type of memory.

PROMs retain their contents even when the computer is turned off.	EPROM retains its contents until it is exposed to ultraviolet light.
PROM can be written only once	Ultraviolet rays is used to erase the Content of a EPROM.

5. Write down the interfaces and ports available in a computer. [S-2020]

1. **Serial Port:** To connect the external devices, found in old computers.
2. **Parallel Port:** To connect the printers, found in old computers.
3. **USB Ports:** To connect external devices like cameras, scanners, mobile phones, external hard disks and printers to the computer.
4. **VGA Connector:** To connect a monitor or any display device like LCD projector.
5. **Audio Plugs:** To connect sound speakers, microphone and headphones.
6. **PS/2 Port:** To connect mouse and keyboard to PC.
7. **SCSI Port:** To connect the hard disk drives and network connectors.

6. Differentiate CD and DVD. [J-2019, M-2020, M-2024]

CD	DVD
❖ CD stands for Compact Disk	❖ DVD Stands for Digital Versatile/ video Disc.
❖ Polycarbonate plastic material	❖ Optical disc
❖ Capacity: CD-ROM is 700MB	❖ Capacity: 4.7 GB
❖ Single-layered sides are usually silver-coloured.	❖ Double-layered sides are usually gold-coloured.
❖ CD data is represented as tiny indentations known as "pits"	❖ DVD-ROM can be visually determined by nothing the number of data sides of the disc.

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

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

1. Explain the types of RAM (AUG-2022)

❖ There are two basic types of RAM 1.Dynamic RAM (DRAM) 2.Static RAM (SRAM)

❖ **Dynamic RAM** being a common type needs to be refreshed frequently.

❖ **Static RAM** needs to be refreshed less often, which makes it faster.

CHAPTER – 4 THEORETICAL CONCEPTS OF OPERATING SYSTEM

1. What are the advantages and disadvantages of Time-sharing features? [M-2023]

Advantage	Disadvantage
❖ Provides the advantages of quick response	❖ Problem of reliability
❖ For each task a fixed time is allocated.	❖ Unreliability during data transmission
❖ Avoids duplication of software	❖ It consumes more resource
❖ Reduces CPU idle time	❖ Problem of data communication

2. List out the key features of Operating system [J-2023]

1.User Interface (UI) 2.Memory Management 3.Process management
4. Security Management 5. Fault Tolerance 6.File Management

3. Write a note on 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.

❖ Since the execution takes place in parallel, this feature is used for high speed execution which increases the power of computing.

1. Write a note following process management system (a) FIFO (b) SJF [S-2020]

FIFO (First In First Out) Scheduling: This algorithm is based on queuing technique.

❖ Assume that a student is standing in a queue (Row) to get grade sheet from his/her teacher.

❖ The other student who stands first in the queue gets his/her grade sheet first and leaves from the queue (Row).

❖ Followed by the next student in the queue gets it corrected and so on.

❖ This is the basic logic of the FIFO algorithm.

SJF (Shortest Job First)Scheduling:

❖ This algorithm works based on the size of the job being executed by the CPU.

❖ Consider two jobs A and B.

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

CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM

1. What are the functions of Windows Operating System? [AUG-2022]

1. Access applications on the computer (Ex: Word processing, Games, Spread sheets, Calculators]
2. Load any new program on the computer.
3. Manage hardware such as printers, scanners, mouse, digital cameras etc.,

4. File management activities [Ex: Creating, Modifying, Saving, Deleting files and folders]
5. Change computer settings. [Colour scheme, Screen savers of our monitor etc]

2. Write a note on Recycle bin. [M-2020, J-2023]

❖ Recycle bin is a special folder to keep the files or folders deleted by the user.
❖ Which means we still have an opportunity to recover them.
❖ The user cannot access the files or folders available in the Recycle bin without restoring it
❖ Restore option is used to restore file or folder from the Recycle bin.

3. Write a note on the elements of a window. [J-2024]

❖ The title bar will display the name of the application and the name of the document opened.
❖ The menu bar is seen under the title bar. Menus in the menu bar can be accessed by pressing Alt key and the letter that appears underlined in the menu title.
❖ The workspace is the area in the document window to enter or type the text of your document.
❖ The scroll bars are used to scroll the workspace horizontally or vertically.
❖ The corners and borders of the window helps to drag and resize the windows.

4. Write the two ways to create a new folder. [M-2023]

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

Method II:
Step 1: In the Desktop, right click → New → Folder.
Step 2: A Folder appears with the default name "New folder".
Step 3: Type the name you want and press Enter Key.
Step 4: The name of the folder will change.

5. Differentiate copy and move

copy	move
❖ **Copy** option is used to copy a file or folder, and paste in a specified location.	❖ **Cut** option is used to move a selected file or folder from one place to another.
❖ It uses the copy and paste option	❖ It uses the cut and paste option
❖ It means to make a duplicate copy of a file	❖ It means to transfer a file from one location to another
❖ Edit – Copy or Ctrl+C or Right click - Copy	❖ Edit – Cut or Ctrl+X or Right click - Cut

1. Write the procedure to create a file in word pad [AUG-2022]

1. Click Start → All Programs → Accessories → Wordpad or Run → type Wordpad, click OK. Word pad window will be opened as folder.
2. Type the contents in the workspace and save the file using File → Save or Ctrl + S.
3. Save As dialog box will be opened.
4. In the dialog box, select the location where you want to save the file by using **look in** drop down list box.
5. Type the name of the file in the **file name** text box.
6. Click save button.

CHAPTER – 6 SPECIFICATION AND ABSTRACTION

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.
Ex: Former, Goat, Grass and Wolf problem.

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

❖ An algorithm is specified by the properties of the given input and the relation between the input and the desired output.
❖ Let P be the required property of the inputs and Q the property of the desired outputs.
Then the algorithm S is specified as
1. algorithm_name (inputs)
2. -- inputs : P
3. -- outputs: Q
❖ This specification means that if the algorithm starts with inputs satisfying P, then it will finish with the outputs satisfying Q.

3. What is abstraction?

❖ A problem can involve a lot of details. Several of these details are unnecessary for solving the problem.
❖ Only a few details are essential.
❖ Ignoring or hiding unnecessary details and modeling an entity only by its essential properties is known as abstraction.
Example:
❖ When we present a state of a process, we select only the variables essential properties is known as abstraction.

4. How is state represented in algorithms? [M-2024]

- ❖ State of a process is abstracted by a set of variables in the algorithm.
- ❖ The state at any point of execution is simply the values of the variables at that point.
- ❖ As the value of the variables are changed, the state changes.

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.
- ❖ **Format / Form** variable := value
- ❖ **Example:** m := 2 (It stores value 2 in variable m.

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

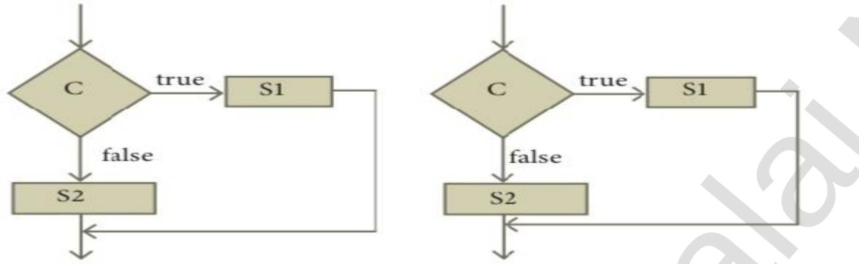
assignment operator:	**equality operator**
❖ Assignment operator is used to assign the right hand side value into left hand side variable.	❖ Equality operator is used to the values of both right hand side variable and left hand side variable and results in either true or false.
Ex: A=5, B=10	Ex: 1. A==5(a=5, b=5)True, 2. A≠B(a=5,b=0) True

1. What is decomposition [M-2020]

- ❖ Decomposition breaks down a problem into smaller sub problems and combine their solutions to solve the original problem.

CHAPTER – 7 COMPOSITION AND DECOMPOSITION

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



PSEUDO CODE

```
1. Enter A, B
2. Initialize Q=0, r=A
3. If r≥B, then do Q=Q+1;
   r = r-B else r,q
4. Exit
```

[OR]

PSEUDO CODE -1

```
if condition is True
    Statement S1
else
    Statement S2
End if
```

PSEDO CODE-2

```
if condition is True
    Statement S1
    Statement   S2
else
    Statement S2
end if
```

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
```

Answer: S1;S2;S4 **[OR]** The control flow for the given algorithm is as follows:

S1
S3
S4

The condition is false so it executes S3.
In this case S2 skipped.

3. What is case analysis? [M-2022]

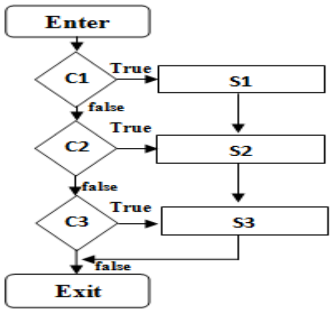
- ❖ Case analysis statement generalizes it to multiple cases.
- ❖ Case analysis splits the problem into an exhaustive set of disjoint cases.
- ❖ For each case, the problem is solved independently.

Example:

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,

1. Function to double number using d = n + n

   double (n)

   - - Input: n is a real number

   - - Output: d is a real number

(2) 2 x n

2. Function to double number using d = 2 x n

   double (n)

   - - Input: n is a real number

   - - Output: d is a real number

<u>Example: Double a value can be done in 2 methods</u>

n=2 (assume)

1) n + n = 2 + 2= 4   2) 2 x n = 2 x 2=4

1. What is a flow chart? Write the disadvantages of flow chart **[S-2020]**

<u>Flowchart:</u>

❖ A flowchart is a collection of boxes containing statements and conditions which are connected by arrows showing the order in which the boxes are to be executed.

<u>Disadvantages:</u>

❖ Flowcharts are less compact than representation of algorithms in programming language or pseudo code.

❖ They obscure the basic hierarchical structure of the algorithms.

❖ Alternative statements and loops are disciplined control flow structures.

❖ Flowcharts do not restrict us to disciplined control flow structures.

2. Define flow chart, pseudo code and a programming language **[J-2019]**

<u>Flow chart:</u>

❖ A flowchart is a collection of boxes containing statements and conditions which are connected by arrows showing the order in which the boxes are to be executed.

<u>Pseudo-code:</u>

❖ Pseudo code is a mix of programming-language-like constructs and plain English.

❖ This notation is not formal nor exact.

❖ It uses the same building blocks as programs, such as variables and control flow.

<u>Programming language:</u>

❖ A programming language is a notation for expressing algorithms so that a computer can execute the algorithm.

❖ An algorithm expressed in a programming language is called a program.

❖ C, C++ and Python are examples of programming languages.

CHAPTER – 8 ITERATION AND RECURSION

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

<u>Answer</u>

❖ Let’s assume,

❖ u – No. of tumblers right side up

❖ v – No. of tumblers upside down

<u>INITIAL STAGE</u> : u = 0,v = 7 (All tumblers upside down)

<u>FINAL STAGE OUPUT</u> : u = 7,v = 0 (All tumblers right side up)

<u>POSSIBLE ITERATIONS:</u>

1) Turning both upside down tumblers to right side up

   u = u+2, v = v-2 [u is even]

2) Turning both right side up tumblers to upside down

   u = u-2, v = v+2 [u is even]

3) Turning one right side up tumblers to upside down and other tumbler from upside down to right side up.

u = u+1-1 = u , v = v+1-1=v [u is even]

- ❖ Initially u=0 and continuous to be even in all the three cases.
- ❖ Therefore u is always even.

INVARIANT:

- ❖ u is even
- ❖ But in the final stage (Goal), u= 7 and v = 0 i.e u is odd
- ❖ Therefore it is not possible to reach a situation where all the tumblers are right side up.

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

Answer:

No.of players(r)	2	3	4	5	n	1234
No.of games(n)	1	2	3	4	n-1	1234-1 = 1233

Explanation:

After every game, r will be reduced by 1.

If r =2 then n = 1

As n increases, r decreases. So, n,r:=n+1, r-1

n+r = (n+1)+(r-1)

n+1+r-1

n+r

Therefore n+r is invariant.

n+r = 1234 (No.of players initially)

- ❖ The winner (only one player) of the tournament that is left after all other players have been knocked out.

i.e n = 1

n+r = 1234

1+r = 1234

r = 1234-1 = 1233

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

Answer:

- ❖ No.of heads of dragon = 1000
- ❖ Sword 1 = cuts 19 heads but 13 heads grow back.
- ❖ Sword 2 = cuts 7 heads but 22 heads grow back.
- ❖ n = number of heads of the dragon at initial state.

Case 1: King uses Sword 1

n:= n-19+13

n-6 No.of heads are reduced by 6.

Case 2: King uses Sword 2

n:= n-7+22

n+15 No.of heads are increased by 15.

1. **What are the values of variable m and n after in assignment in line (1) and line (3)?** **[M-2019]**

1) m,n:=4,10 **Ans:** 1) m =4 , n = 10 3) m =9 , n = 8

2) - -m, n = ? , ?

3) m, n:=m+5, n-2

4) - -m, n = ? , ?

CHAPTER – 9 (PART – 1) INTRODUCTION TO C++

1. **Describe the differences between keywords and identifiers? (or) Write a short note on** **[M-2020]**

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, age,class-11B,etc

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

- ❖ Yes. C++ is a case sensitive programming language.
- ❖ C++ is case sensitive as it treats upper and lower-case characters differently.

- ❖ Capital letters ≠ small letters. The keywords must be in lowercase.

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

=	= =
❖ It is a assignment operator)	❖ It is a relational operator
❖ It is used to assign a value of variable or expression.	❖ It used to compare two values and the result will be either true or false.
❖ Ex: x = y (y value is assigned to x)	❖ Eg: x = = y (x value will be compared with y value)

4. What is the use of a header file?

- ❖ #include <iostream> statement tells the compiler's pre-processor to include the header file "iostream" in the program.
- ❖ 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.

5. Why is main function special? [J-2024]

- ❖ C++ program is a collection of functions.
- ❖ Every C++ program must have a main function.
- ❖ The main ( ) function in the C++ programs is the starting point.
- ❖ All the C++ programs begin their execution in main ().
- ❖ Therefore, the executable statements should be inside the main ( ) function.

1. Write a note on logical operators in C++ (S-2020) (AUG-2022)

- ❖ A logical operator is used to evaluate logical and relational expressions.
- ❖ The logical operators act upon the operands that are themselves called as logical expressions.
- ❖ C++ provides three logical operators.

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

2. What are keywords? Can keywords be used as identifiers? [M-2022]

- ❖ Keywords are the reserved words which convey specific meaning to the C++ compiler.
- ❖ No, Reserved words or keywords cannot be used as an identifier name.

CHAPTER – 9 (PART – 2) DATA TYPES, VARIABLES AND EXPRESSIONS

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

- ❖ Arithmetic operators perform simple arithmetic operators like, addition, subtraction, multiplication, division etc.
- ❖ The above mentioned arithmetic operators are binary operators which requires minimum of two operands.

Unary operator	Binary operator
A unary operator require only one operand.	Binary operator requires two operands
Ex: +,-,*, /,%, AND, OR	**Ex**: ++ Increment operator, -- Decrement operator.

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

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

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;
n=5+4/5                     =2.5*5+4                =5*2.5+x
  = 5+0                     =12.5+4                 =12.5+5   = 17.5
n=5                     z=16                    z=17
```

1. Types of conversion? Write short note on implicit type conversion [M-2019]

- ❖ (Two types) 1. Implicit type conversion 2.Explicit type conversion.

<u>Implicit type conversion :</u>

- ❖ An Implicit type conversion is a conversion performed by the compiler automatically.
- ❖ So, implicit conversion is also called as "Automatic conversion".

CHAPTER – 10 FLOW OF CONTROL

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

if (x >= 10) a = m + 5; else a = m; **<u>Answer:</u>** a=(x> =10)? m+5: m;

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

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

3. **Write a C++ program to print multiplication table of a given number.** **[AUG-2022, J-2024]**

```
#include<iostream>
using namespace std;
int main()
{
int num;
cout<<"Enter Number To Find Multiplication table ";
cin>>num;
for(int a=1;a < =10; a++)
{
cout<<num<<" * "<<a<<" = "<<num*a<<endl;
}
return 0;
}
```

Output :

```
Enter Number To Find Multiplication table   3
3x1=3    3x2=6    3x3=9   3x4=12   3x5=15
3x6=18  3x7=21  3x8=24  3x9=27   3x10=30
```

4. **Write the syntax and purpose of switch statement.** **[M-2019, M-2022, J-2024]**

Syntax:

```
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: a) 1 4 7 10...... 40**

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

Output:

```
1 4 7 10 13 16 19 22 25 28 31 34 37 40
```

1. **Write a c++ program to sum the numbers from 1 to 10 using 'for' loop.** **[M-2022]**

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

Output

```
The sum of 1 to 10 is 55
```

2. Write a short program to print following series: 1 3 5 7…75 **[J-2019]**

```
#include<iostream>
using namespace std;
int main()
{
int n;
for(int i=1;i<=75,i+=2)
cout<<i<< "\t";
getch ( );
}
```

Output:

```
1 3 5 7 9 11 13 15 …..75
```

3. Write a C++ program to display numbers from 1 to 10. Except 5 using 'for' and 'continue' Statement. **[M-2023]**

```
#include<iostream>
using namespace std;
int main()
{
int i;
for(i=1;i<=10;i++)
{
if(i==5)
{
continue;
}
cout<<i<<"\n";
}
return 0;
}
```

Output:

```
1,2,3.4,6,7,8,9,10
```

4. Differentiate – break and continue statement **[J-2023]**

Break	Continue
Break is used to **terminate** the execution of the loop.	Continue is not used to terminate the execution of loop.
It **breaks** the iteration.	It **skips** the iteration.
When this statement is executed, control will come out from the loop and executes the statement immediate after loop.	When this statement is executed, it will not come out of the loop but moves/jumps to the next iteration of loop.
Break is used with loops as well as switch case.	Continue is only used in loops, it is not used in switch case.

5. What is null statement and compound statement? **[M-2022]**

Null statement: The "null or empty statement" is a statement containing only a semicolon.

Compound (Block) statement:

- ❖ C++ allows a group of statements enclosed by pair of braces {}.
- ❖ This group of statements is called as a compound statement or a block.

6. Write a C++ program to display number from 5 to 1 using do-while loop **[M-2024]**

```
#include<iostream>
using namespace std;
int main()
{
int n=5;
do
{
cout<<n<<",";
n--;
}
while(n>0);  [OR] while(n>=1);
return 0;
}
```

CHAPTER – 11 FUNCTIONS

1. What is Built-in functions?

- ❖ The functions which are available by default are known as "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.

Example: **stdio.h –** it contains pre-defined **"standard input/output"** functions.

2. What is the difference between isuppr () and toupper () functions? **[J-2019, M-2020, M-2024]**

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.
❖ General form: isupper(char c);	❖ General form: toupper(char c);
❖ Ex: **int n=isupper('A');**	❖ Ex: **char c = toupper('k'); -- K**

3. Write about strcmp () function. **[M-2020, M-2023]**

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

<u>The strcmp() function returns a:</u>

- ❖ 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++. **[J-2024]**

- ❖ 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:
  1.base – the base value **2.exponent** – exponent of the base.

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

1. The return value of the function is of type long.
2. **Fact** is the name of the function.

<u>The function is called with two arguments:</u>

1. The first argument is of int **data** type.
2. 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 allows to omit some arguments when calling the function.
- ❖ When calling a function,
  1. For any missing arguments, complier uses the values in default arguments for the called function.
  2. The default value is given in the form of variable initialization.

Example : defaultvalue(x,y); defaultvalue(200,150);

1. Write note on User-Defined functions **[M-2022]**

- ❖ C++ also provides the facility to create new functions for specific task as per user requirement.
- ❖ The name of the task and data required (arguments) are decided by the user and hence they are known as User-defined functions.

2. Write a note on local scope **[AUG-2022]**

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

CHAPTER – 12 ARRAYS AND STRUCTURES

1. Define an Array? What are the types? **[M-2020, M-2024]**

- ❖ An array is a collection of variables of the same type that are referenced by a common name.
- ❖ Types: 1. One-dimensional 2. Two-dimensional 3. Multi-dimensional arrays

2. With note an Array of strings. **[AUG-2022]**

- ❖ 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.
- ❖ Usually, array of strings are declared in such a way to accommodate the null character at the end of each string.
- ❖ **Declaration of 2D Array:** Char Name[6][10];

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:

// Accept student details

```
cout<<”Enter exam number”<<endl;   cout<<”Enter student name”<<endl;   cout<<”Enter language mark”<<endl;
cin>>s[i].examno;                  cin>>s[i] name;                     cin>>s[i]lang;
cout<<”Enter English mark”<<endl;  cout<<”Enter Physics mark”<<endl;   cout<<”Enter Chemistry mark”<<endl;
cin>>s[i]lang;                     cin>>s[i]phy;                       cin>>s[i]che;
cout<<”Enter Maths mark”<<endl;    cout<<”Enter Comp.sci mark”<<endl;
cin>>s[i]mat;                      cin>>s[i]csc;;
```

//check for name starts with letter “S”

```
if (s[i].name = =’S’)
{
cout<<”Exam number:”<<s[i].exam<<endl;  cout<<”Name:”<<s[i].name<<endl;   cout<<”Language:”<<s[i].lang<<endl;
cout<<”English:”<<s[i].eng<<endl;       cout<<”Physics:”<<s[i].phy<<endl;  cout<<”Chemistry:”<<s[i].che<<endl;
cout<<”Maths:”<<s[i].mat<<endl;         cout<<”Csc:”<<s[i].csc<<endl;
total=s[i].lang+s[i].eng+s[i].phy+s[i].che+s[i].mat+s[i].csc;
cout<<”Total:”<<total<<endl;
}
```

4. How to access members of a structure? Give example. **[M-2020, J-2024]**

❖ Once the objects of structure type are declared, their members can be accessed directly.

Syntax: Object name **.** Member

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

Example: student.rollno, student.age and student.weight .

5. What is called anonymous structure .Give an example? [J-2023]

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

Example:

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

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

1. What is called nested structure? Give example. **[M-2019]**

❖ The structure declared within another structure is called as nested structure.

Example:

```
struct student
{
int age;
float height, weight;
struct dob
{
int date;
char month[4];
int year;
};
}s1;
```

CHAPTER – 13 OBJECT ORIENTED PROGRAMMING TECHNIQUES

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.
1. Procedural, 2.Modular,3. Object Oriented Programming.

2. Write a note on the features of procedural programming. **[J-2023]**

❖ Programs are organized in the form of subroutines or sub programs. All data items are global.

❖ Suitable for small sized software application.

❖ Difficult to maintain and enhance the program code as any change in data type needs to be propagated to all subroutines that use the same data type.

- ❖ This is time consuming. **Example:** FORTRAN and COBOL.

3. List some of the features of modular programming. **[J-2019, S-2020]**

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

Example: Pascal and C

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

Modularisation: Where the program can be decomposed into **modules**.

Software re-use: Where a program can be composed from existing and **new modules.**

5. Define information hiding.

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

1. Define Encapsulation **[M-2019]**

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

CHAPTER – 14 CLASSES AND OBJECTS

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

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

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

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

Example program to illustrate dynamic initialization

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

Output :

```
Enter the Roll Number 1201
Enter the Average 98.6
Roll number :1201
Average :98.6
```

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

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

When constructor and destructor are declared under public:

- ❖ The advantages of declaring constructors and destructor under public accessibility is that its object can be created in any function.
- ❖ A constructor can be defined either in private or public section of a class.
- ❖ If it is defined in public section of a class, then its object can be created in any function.
- ❖ Easy to access other classes compare to others (private, protected)

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

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

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

- ❖ Function 1 is called Destructor.
- ❖ It is executed automatically when an object of the class TestMeOut goes out of scope.

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

- ❖ Function 2 is called Constructor.
- ❖ It is executed automatically when an Instance of the class TestMeOut comes into the scope.

1. What are the ways to define member function of a class? Give example. **[J-2019]**

- ❖ The member functions of a class can be defined in two ways. 1.Inside 2.Outside class definition

Inside the class definition:

- ❖ When a member function is defined inside a class, it behaves like inline functions. These are called Inline member functions.

Outside the class definition:

- ❖ When Member function defined outside the class just like normal function definition then it is be called as outline member function or non-inline member function**. Ex:** void add :: display()

2. Write a short notes on class access specifies of C++. **[M-2023]**

- ❖ **Private Members:** Cannot be accessed from outside the class.
- ❖ **Public Members:** Accessible from anywhere outside the class but within a program.
- ❖ **Protected Members:** Similar to a private member but it provides one additional benefit that they can be accessed in child classes.

3. Read the following snippet answer the questions given below. **[J-2019]**

```
class student
{
int m,n;
public void add();
Float calc();
} x1,x2;
```

i) identify the member of the class?

Ans: m , n, add() , calc ()

ii) What is size of the objects x1,x2 in memory?

Ans: x1=8 bytes, x2=8 bytes

4. Read the following C++ code and answer the questions given below. **[M-2020]**

```
#include<iomanip>
#include<iostream>
using namespace std;
class product
{
int code, quantity;
float price;
public:
void assigndata();
void print();
```

QUESTIONS

1.What is the name of the class in the above program?

Answer: product

2. What are the data members are the class?

Answer: code, quantity, price

3. What is the memory size of the objects p1,p2?

Answer: Memory allocation for object p1 12

Memory allocation for object p2 12

```
int main() { product p1,p2;  cout<<"\n Memory allocation for object p1"<<sizeof(p1);
cout<<"\n Memory allocation for object p2"<<sizeof(p2); return 0; }
```

CHAPTER – 15 POLYMORPHISM

1. What are the rules for function overloading? [S-2020]

- ❖ The overloaded function must differ in the number of its arguments or data types.
- ❖ The return type of over loaded 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 over loading.

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

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

Example:

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

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

- ❖ The term operator overloading, refers to giving additional functionality to the normal C++ operators like +,++,-,—,+=,-=,*.<,>.
- ❖ It is also a type of polymorphism in which an operator is overloaded to give user defined meaning to it.

Example:

- ❖ '+' operator can be overloaded to perform addition on various data types, like for integer, string etc.

4. 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.

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

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

1. What is operator overloading? Give some example of operators which can not be overloaded. [J-2019]

Operator over loading:

- ❖ The term operator overloading, refers to giving additional functionality to the normal C++ operators like +,++,-,—,+=,-=,*.<,>.
- ❖ It is also a type of polymorphism in which an operator is overloaded to give user defined meaning to it.

Example:

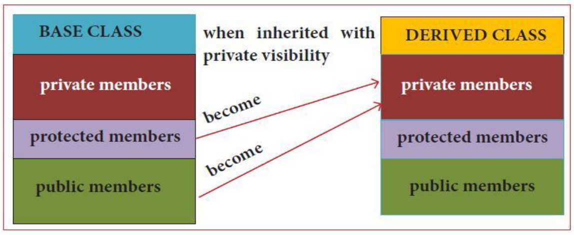
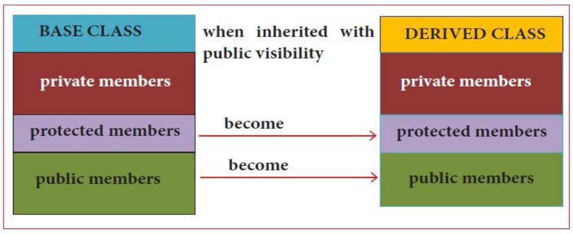
1.Scope operator (**::**) 2.Sizeof 3.Member selector (**.**) 4.Member pointer selector (✳) 5.Ternary operator (**?:**)

CHAPTER – 16 INHERITANCE

1. What are the points to be noted while deriving a new class? [M-2019, M-2024]

- ❖ 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.
- ❖ The names of the base classes (parent class).

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

Private visibility mode	Public 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.
 BASE CLASS private members protected members public members when inherited with private visibility become become DERIVED CLASS private members protected members public members	 BASE CLASS private members protected members public members when inherited with public visibility become become DERIVED CLASS private members protected members public members

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

Polymorphism	Inheritance
❖ Reusability code implemented through functions (or) methods.	❖ Reusability of code is implanted through classes.
❖ Polymorphism is the ability of a message or function to respond differently to different message.	❖ It is the process of creating derived classes from the base class or classes.
❖ Polymorphism is achieved through function and operator overloading.	❖ Inheritance is achieved by various types of inheritances namely single, multiple, muti level, hybrid and hierarchical inheritances.

4. What do you mean by overriding? [J-2023]

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

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

<u>Some Facts About the execution of constructor in inheritance:</u>

- ❖ Base class constructors are executed first before the derived class constructor's execution.
- ❖ Derived class cannot inherit the base class constructor but it can call the base class constructor by using , **Base_class name::base_class_constructor() in derived class definition.**

<u>Some Facts About the execution of destructor in inheritance:</u>

- ❖ If there are multiple base classes, then its start executing from the left most base class.
- ❖ In multilevel inheritances, the constructors will be executed in the order of inheritance.
- ❖ The destructors are executed in the reverse order of inheritance.

1. Write about three visibility mode [M-2020]

- ❖ When a base class is inherited with **<u>private visibility mode</u>** the public and protected members of the base class become 'private' members of the derived class.
- ❖ When a base class is inherited with **<u>protected visibility mode</u>** the protected and public members of the base class become 'protected' members of the derived class
- ❖ When a base class is inherited with **<u>public visibility mode</u>**, the protected members of the base class will be inherited as protected members of the derived class.

2. Consider the following c ++ code and answer the questions [S-2020]

```
class Personal
{
int admno,rno;

protected:
char Name[20];
public:
personal();
void pentry();
void Pdisplay(); };
class Marks:private Personal
{ int M
protected:
char Grade[5];
public:
Marks();
void Mentry();
void Mdisplay(); };
class Result:public Marks
{
float Total,Agg;
char remark[5];
result();
void Rcalculate();  void Rdisplay();
```

1 **Which type of Inheritance is shown in the program?**

Multilevel inheritance

2 **Specify the visibility mode of base classes.**

Marks – Public visibility mode Personal- Private visibility mode.

3.**Name the base class(/es) and derived class (/es).**

Base Class ⟶ Personal   Derived Class ⟶ Marks and Result

CHAPTER – 17 COMPUTER ETHICS AND CYBER SECURITY

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. **[M-2023]**

Encryption:

- ❖ Processes that ensure confidentiality that only authorized persons can access the information.
- ❖ The process of translating the plain text data into random and mangled data.
- ❖ Used by militaries and governments to facilitate secret communication.

Decryption: Reverse process of converting the cipher-text back to plaintext.

3. Explain about proxy server.

- ❖ A proxy server acts as an intermediary between the end users and a web server.
- ❖ 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? **[S-2020]**

1.Honesty :

- ❖ Users should be truthful while using the internet.

2.Confidentiality:

- ❖ Users should not share any important information with unauthorized people.

3.Respect :

- ❖ Each user should respect the privacy of other users.

4.Professionalism:

- ❖ Each user should maintain professional conduct.

5.Obey The Law:

- ❖ Users should strictly obey the cyber law in computer usage.

6.Responsibility:

- ❖ Each user should take ownership and responsibility for their actions.

5. What are ethical issues? Name some. **[M-2022]**

- ❖ 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:

1. Cyber-crime 2) Software Piracy 3) Unauthorized Access 4) Hacking 5) Use of computers to commit fraud
6) Sabotage in the form of viruses 7) Making false claims using computers.

1. What is meant by computer ethics? **[AUG-2022]**

- ❖ Computer ethics deals with the procedures, values and practices that govern the process of consuming computer technology and its related disciplines without damaging or violating the moral values and beliefs of any individual, organization or entity.
- ❖ It is a set of moral principles that rule the behaviour of individuals who use computers.
- ❖ An individual gains knowledge to follow the right behaviour, using morals that are also known as ethics.

CHAPTER – 18 TAMIL COMPUTING

1. Write a short note on Tamil virtual Academy. **[M-2023]**

- ❖ With the objectives of spreading Tamil to the entire world through internet, Tamil Virtual University was established by the Govt. of Tamilnadu.
- ❖ This organization functions with the name of "Tamil Virtual Academy".
- ❖ It offers different courses in Tamil language, Culture, heritage etc.,

CHAPTER 1 TO 18 FIVE MARK BOOK BACK & PUBLIC QUESTION WITH ANSWERS

CHAPTER – 1 INTRODUCTION TO COMPUTERS

1. Explain the basic components of a computer with a neat diagram. **[M-2019, J-2023, M-2024]**

- ❖ The computer is the combination of hardware and software.
- ❖ Hardware is the physical component of a computer like motherboard, memory devices, monitor, keyboard etc.,
- ❖ Software is the set of programs or instructions.
- ❖ Both hardware and software together make the computer system to function.
- ❖ Every task given to a computer follows an Input- Process- Output Cycle (IPO cycle).
- ❖ It needs certain input, processes that input and produces the desired output.

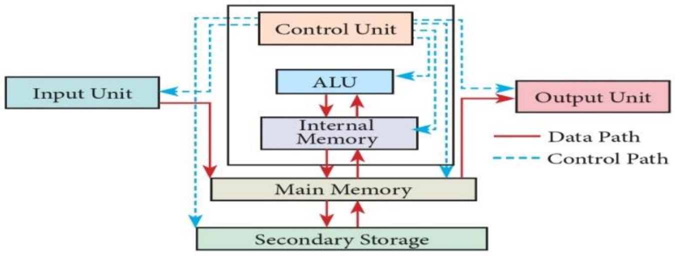


Figure 1.3 components of a computer

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):

- ❖ 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.

1.Arithmetic and Logic Unit:

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

2.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.

3.Output Unit:

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

4.Memory Unit:

- ❖ The Memory Unit is of two types which are primary memory and secondary memory.
- ❖ The primary memory is used to temporarily store the programs and data.
- ❖ The secondary memory is used to store the data permanently.
- ❖ The Primary Memory is volatile, the Random Access Memory (RAM) is an example of a main memory.
- ❖ The Secondary memory is non-volatile, hard disk, CDROM and DVD ROM are examples of secondary memory.

2. Discuss the various generations of computers. **[J-2019, AUG-2022, M-2020, M-2023, J-2024]**

Generation & Period	Main Component used	Merits/Demerits
First Generation 1940-1956	**Vacuum tubes**	❖ Big in size ❖ Consumed more power ❖ Malfunction due to overheat ❖ Machine Language was used
Second Generation 1956-1964	**Transistors**	❖ Smaller compared to First Generation ❖ Generated Less Heat ❖ Consumed less power compared to first generation ❖ Punched cards were used ❖ First operating system was developed – Batch Processing and Multiprogramming Operating System ❖ Assembly language was used.
Third Generation 1964-1971	**Integrated Circuits (IC)**	❖ Computers were smaller, ❖ faster and more reliable ❖ Consumed less power ❖ High Level Languages were used
Fourth	**Microprocessor**	❖ Smaller and Faster

Generation 1971-1980	Very Large Scale Integrated Circuits (VLSI)	❖ Microcomputer series such as IBM and APPLE were developed ❖ Portable Computers were introduced.
Fifth Generation 1980 – till date	Ultra Large Scale Integration(ULSI)	• Parallel Processing • Super conductors • Computers size was drastically reduced. • Can recognise Images and Graphics • Introduction of Artificial Intelligence and Expert Systems • Able to solve high complex problems including decision making • Logical reasoning
Sixth Generation In future	❖ Parallel and Distributed computing ❖ Computers have become smarter, faster and smaller ❖ Development of robotics ❖ Natural Language Processing ❖ Development of Voice Recognition Software	

3. **Explain the following a. Inkjet Printer b. Multimedia projector c. Bar code / QR code Reader**

1.Inkjet Printers:

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

2.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.

3. i) Bar Code / QR Code Reader:

❖ A Bar code is a pattern printed in lines of different thickness.
❖ The Bar code reader scans the information on the bar codes transmits to the Computer for further processing.
❖ The system gives fast and error free entry of information into the computer.

ii) QR (Quick response) Code:

❖ The QR code is the two dimension bar code which can be read by a camera and processed to interpret the image.

1. **Explain Data and information [M-2022]**

Data:

❖ Data is defined as an un- processed collection of raw facts, suitable for communication, interpretation or processing.
❖ For example, 134, 16 'Kavitha', 'C' are data.
❖ This will not give any meaningful message.

Information:

❖ Information is a collection of facts from which conclusions may be drawn.
❖ In simple words we can say that data is the raw facts that is processed to give meaningful, ordered or structured information.
❖ For example Kavitha is 16 years old.
❖ This information is about Kavitha and conveys some meaning.
❖ This conversion of data into information is called data processing.

2. **What is an output unit? Explain any three output unit. [M-2024]**

Output Unit:

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

Output Devices:

1.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.
❖ There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).
❖ The monitor works with the VGA (Video Graphics Array) card.
❖ The video graphics card helps the keyboard to communicate with the screen.
❖ It acts as an interface between the computer and display monitor.

2.Plotter:

❖ Plotter is an output device that is used to produce graphical output on papers.
❖ It uses single color or multi color pens to draw pictures.

3.Printers:

❖ Printers are used to print the information on papers.
❖ Printers are divided into two main categories: 1. Impact Printers 2.Non Impact printers

Impact Printers:

❖ 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.
- ❖ For example, Dot Matrix printers and Line matrix printers are impact printers.

Non-Impact Printers:

- ❖ These printers do not use striking mechanism for printing.
- ❖ They use electrostatic or laser technology.
- ❖ Quality and speed of these printers are better than Impact printers.
- ❖ For example, Laser printers and Inkjet printers are non-impact printers.

4.Speakers:

- ❖ Speakers produce voice output (audio) .
- ❖ Using speaker along with speech synthesise software, the computer can provide voice output.
- ❖ This has become very common in places like airlines, schools, banks, railway stations, etc.

5.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.

CHAPTER – 2 (PART – 1) NUMBER SYSTEMS

1. **a) Write the procedure to convert fractional Decimal to Binary** **[M-2023]**

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

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

- ❖ Step 1: Multiply the decimal fraction by 2 and note the integer part.
- ○ The integer part is either 0 or 1.
- ❖ Step 2: Discard the integer part of the previous product.
- ○ Multiply the fractional part of the previous product by 2.
- ○ Repeat Step 1 until the same fraction repeats or terminates (0).
- ❖ Step 3: The resulting integer part forms a sequence of 0s and 1s that become the binary equivalent of decimal fraction.
- ❖ Step 4: The final answer is to be written from first integer part obtained till the last integer part obtained.

b) Convert $(98.46)_{10}$ to binary: [S-2020, M-2023]

I. Integer Part:		**II. Fractional Part:**	**Integer**	
2 98	98 = $(1100010)_2$	0.46x2= 0.92	= 0	
2 49-0		0.92x2= 1.84	= 1	**$(46)_{10}$ = $(.0110010)_2$**
2 24-1		0.84x2= 1.68	= 1	
2 12-0		0.68x2= 1.36	= 1	**$(98.46)_{10}$ = $(1100010.0111010….)_2$**
2 6-0		0.36x2 = 0.72	= 0	
2 3-0		0.72x2= 1.44	= 1	
1-1		0.44x2= 0.88	= 0	

2. **Find 1's Complement and 2's Complement for the following Decimal number a) -98 b) - 135**

2 98	(98)	→	1100010
2 49-0	8 bit	→	01100010
2 24-1	1's compliment	→	10011101
2 12-0	**(-98)**	→	**$(10011110)_2$**
2 6-0			
2 3-0			
1-1			

							1	
1's	1	0	0	1	1	1	0	1
								1
2's	**1**	**0**	**0**	**1**	**1**	**1**	**1**	**0**

b) (-135)

2 135	(135)	→	10000111
2 67-1	8 bit	→	10000111
2 33-1	1's compliment	→	01111000
2 16-1	2's compliment	→	01111001
2 8-0	**(-135)**	→	**$(01111001)_2$**
2 4-0			
2 2-0			
1-0			

1's	0	1	1	1	1	0	0	0
								1
2's	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**1**

3. **a) Add $1101010_2 + 101101_2$** **[S-2020, J-2023, J-2024]**

	1	1		1				
		1	1	0	1	0	1	0
			1	0	1	1	0	1
+	**1**	**0**	**0**	**1**	**0**	**1**	**1**	**1**

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

b. Subtract $1101011_2 - 111010_2$

		0	10	10				
		$\cancel{1}$	$\cancel{1}$	$\cancel{0}$	1	0	1	1
			1	1	1	0	1	0
-		0	1	1	0	0	0	1

$1101011_2 - 111_2$ = **110001_2**

1. **Find the 2's complement of $(-46)_{10}$ 2) Convert $(145)_8$ to binary** **[S-2020]**

1. (-46)

2 46 (46) → 101110
2 23-0 8 bit → 00101110
2 11-1 1's compliment → 11010001
2 5-1
2 2-1
1-0

							1	
1's	1	1	0	1	0	0	0	1
								1
2's	1	1	0	1	0	0	1	0

(-46) → 11010010

2) Convert $(145)_8$ to binary

$(145)_8$ $(?)_2$

1 4 5

001 100 101 $(145)_8 = (001100101)_2$

2. **Explain 1's complement representation with an example (AUG-2022)**

1's Complement representation:

❖ This is an easier approach to represent signed numbers.

❖ This is for negative numbers only i.e. the number whose MSB is 1.

The steps to be followed to find 1's complement of a number:

Step 1: Convert given Decimal number into Binary

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

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

Example:

(-24)
2 24 (24) → 11000
2 12-0 8 bit → 00011000
2 6-0 1's compliment → 11100111
2 3-0
1-1

3. **Convert the following:** **[M-2019]**

(i) $(1920)_{10} = (\ )_8$ **Ans:** $(3600)_8$ (ii) $(1920)_{10} = (\ )_2$ **Ans:** $(111\ 1000\ 0000)_2$
(iii) $(8BC)_{16} = (\ )_2$ **Ans:** $(1000\ 1011\ 1100)_2$ (iv) $(6213)_8 = (\ )_2$ **Ans:** $(1100\ 1000\ 1011)_2$
(v) $(255)_{10} = (\ )_{16}$ **Ans:** $(FF)_{16}$

4. **Perform binary addition for the following i) $(-21)_{10}+(5)_{10}$ ii) i) $(-12)_{10}+(15)_{10}$** **[M-2024]**

i] $-21_{10} + 5_{10} = (?)_2$

2 21 2 5
2 10-1 2 2-1
2 5-0 1-0
2 2-1
1-0

21 → $(10101)_2$ 5 → $(101)_2$
8 bit → 00010101 8 bit → 00000101
1's → 11101010
2's → 11101011

- 21								
1’s	1	1	1	0	1	0	1	0
								1
2’s	1	1	1	0	1	0	1	1

				1	1	1	1	
-21_{10}	1	1	1	0	1	0	1	1
5_{10}	0	0	0	0	0	1	0	1
+	1	1	1	1	0	0	0	0

$-21_{10}+5_{10}$ = **-16_{10} = ($11110000)_2$**

ii] - $12_{10}+15_{10}$ = $(?)_2$

2 12 2 15
2 6-0 2 7-1
2 3-0 3-1
1-1 1-1

12 → $(1100)_2$ 15 → $(1111)_2$
8 bit → 00001100 8 bit → 00001111
1’s → 11110011
2’s → 11110100

- 12						1	1	
1’s	1	1	1	1	0	0	1	1
								1
2’s	1	1	1	1	0	1	0	0

1	1	1	1	1	1			
-12_{10}	1	1	1	1	0	1	0	0
15_{10}	0	0	0	0	1	1	1	1
+ 1	0	0	0	0	0	0	1	1

$-12_{10}+15_{10}$ = **3_{10} = ($10000011)_2$**

CHAPTER -2 (PART - 2) BOOLEAN ALGEBRA

1. Explain the fundamental gates with expression and truth table. **[J-2024]**

❖ A gate is a basic electronic circuit which operates on one or more signals to produce an output signal.

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

1.AND Gate:

❖ The AND gate can have two or more input signals and produce an output signal.

❖ The output is "true" only when both inputs are "true", otherwise, the output is "false".

❖ The output of the AND gate is represented by C, where A and B are two Boolean variables

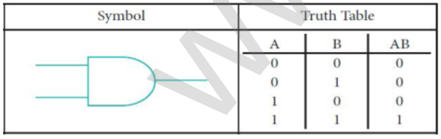
❖ A variable can take either of the values '0' or '1'.

AND gate C = AND B

AND Operation: C = A.B or C = AB

Example: C = A.B
= 0.0
= 0

Symbol & Truth table for AND Gate:



Symbol	Truth Table		
	A	B	AB
	0	0	0
	0	1	0
	1	0	0
	1	1	1

2.OR Gate:

❖ The OR gate gets its name from its behaviour like the logical inclusive "OR".

❖ The output is "true"”/1” if either or both of the inputs are "true"/”1”.

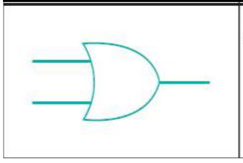
❖ If both inputs are "false"/”0” then the output is "false” /”0”.

OR gate C = A OR B

OR Operation: C = A+B

Example: C = A+B
= 1+1
= 1

Symbol & Truth table for AND Gate:



A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

3.NOT Gate:

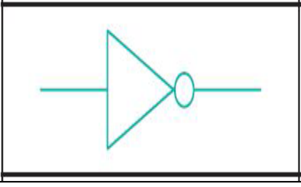
- ❖ The NOT gate, called a logical inverter, has only one input.
- ❖ It reverses the logical state.
- ❖ In other words the output C is always the complement of the input.

NOT gate C = NOT A

NOT Operation: $C = \overline{A}$

Example: if A is 0, $C = 0 = \overline{1}$; On the other hand, if A is 1, C= 1 = 0

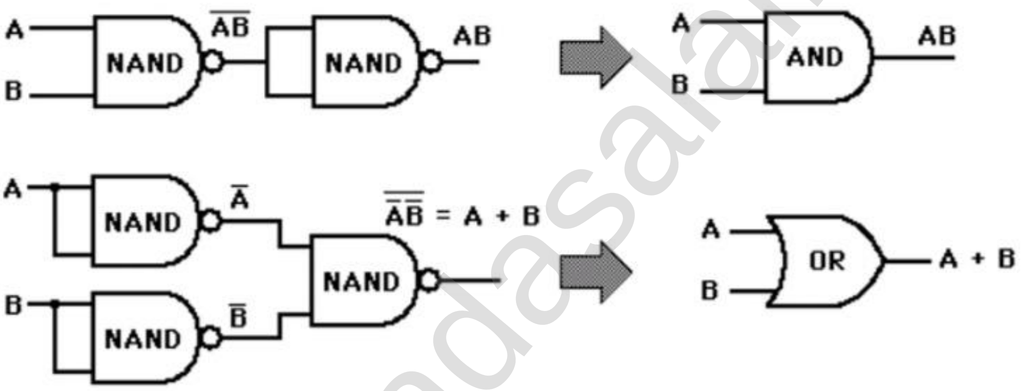
Symbol & Truth table for AND Gate:



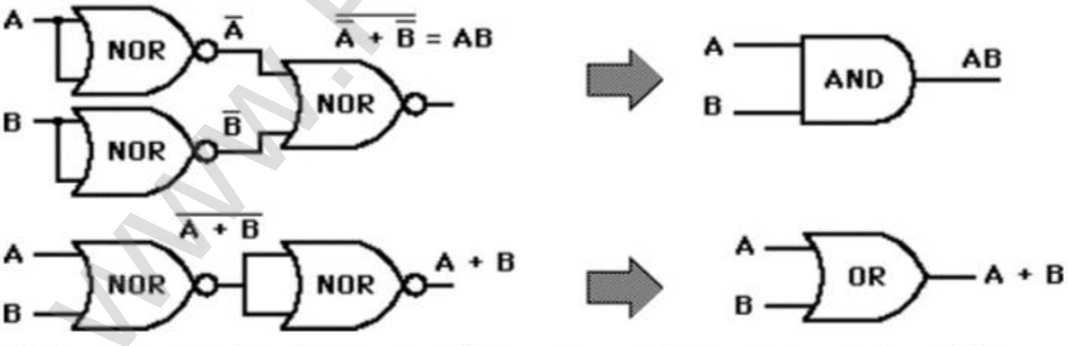
A	$\overline{A}$
0	1
1	0

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

➢ Implementing NAND gate through the AND & OR gates.



➢ Implementing NOR gate through the AND & OR gates.



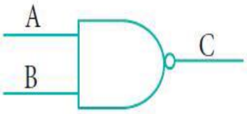
3. Explain the Derived gates with expression and truth table.

- ❖ The other logic gates like NAND, NOR, XOR and XNOR are derived gates which are derived from the fundamental gates.

1.**NAND Gate:**

- ❖ The NAND gate operates an AND gate followed by a NOT gate.
- ❖ The output is "false"/”0” if both inputs are "true"/”1”, otherwise, the output is "true"/”1”.

The logical symbol of NAND gate is



The output of the NAND gate is

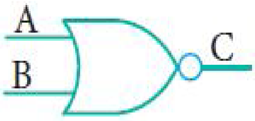
$C = \overline{(A . B)}$

The truth table for NAND gate is

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

2. NOR Gate:

- ❖ The NOR gate circuit is an OR gate followed by an inverter.
- ❖ Its output is "true", if both inputs are "false"/"0" Otherwise, the output is "false"/"0".



The output of NOR gate is

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

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

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

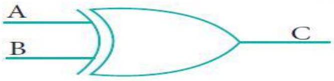
3. XOR Gate:

- ❖ The XOR (exclusive - OR) gate acts in the same way as the logical "either/or."
- ❖ The output is "true"/"0" if either, but not both, of the inputs are "true"/"1".
- ❖ The output is "false"/"0" if both inputs are "false"/"0" or if both inputs are "true"/"1".
- ❖ In Boolean algebra, exclusive - OR operator ⊕ or "encircled plus".

In boolean algebra. exclusive - OR operator ⊕ or "encircled plus".

Hence $C = A \oplus B$

The logical symbol of XOR gate is



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

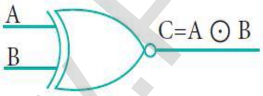
4. XNOR Gate:

- ❖ The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter.
- ❖ Its output is "true"/"1" if the inputs are the same, and "false"/"0"if the inputs are different.

XNOR Gate Expression:

- ❖ (Using De Morgan's Theorem)
- ❖ In boolean algebra, ⊙ or "included dot" stands for the XNOR.
- ❖ Therefore, C = A ⊙ B

The logical symbol is



The truth table for XNOR Gate is

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

CHAPTER – 3 COMPUTER ORGANIZATION

1. **Explain the characteristics of a microprocessor.** **[J-2019, AUG-2022, J-2023]**

- ❖ A Microprocessor's performance depends on the following characteristics:
  a) Clock speed b) Instruction set c) Word size

a) Clock Speed:

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

b) Instruction Set:

- ❖ A command which is given to a computer to perform an operation on data is called an **instruction**.
- ❖ Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**.
- ❖ This instruction set carries out the following types of operations:
  1.Data transfer, 2.Arithmetic operations, 3.Logical operations, 4.Control flow , 5.Input/output

c) Word Size:

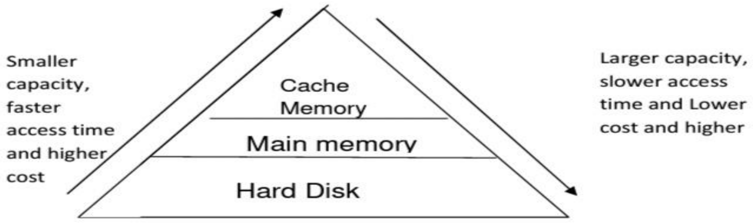
- ❖ The number of bits that can be processed by a processor in a single instruction is called its word size.
- ❖ **Word size** determines the amount of RAM that can be accessed by a microprocessor.

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

- ❖ A bus is a collection of wires used for communication between the internal components of a computer.
- ❖ The read operation transfers the data (bits) from word to Memory Data Register.

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

3. Arrange the memory devices in ascending order based on the access time. **[M-2023]**


Smaller capacity, faster access time and higher cost
Cache Memory
Main memory
Hard Disk
Larger capacity, slower access time and Lower cost and higher

Cache Memory :

- ❖ The cache memory is a very high speed and expensive memory, which is used to speed up the memory retrieval process.
- ❖ Due to its higher cost, the CPU comes with a smaller size of cache memory compared with the size of the main memory.

Random-Access Memory (RAM):

- ❖ The main memory is otherwise called as Random Access Memory.
- ❖ It is the place in a computer where the Operating System, Application Programs and the data in current use are kept temporarily so that they can be accessed by the computer's processor.
- ❖ The smallest unit of information that can be stored in the memory is called as a bit.
- ❖ RAM is a volatile memory

Hard Disk :

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

4. Explain the types of ROM. **[M-2022, M-2024, J-2024]**

Read only memory(ROM)

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

1.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.
- ❖ Unlike the main memory, PROMs retain their contents even when the computer is turned off.
- ❖ The PROM differs from ROM.
- ❖ PROM is manufactured as a blank memory, whereas a ROM is programmed during the manufacturing process itself.
- ❖ PROM programmer or a PROM burner is used to write data to a PROM chip.
- ❖ The process of programming a PROM is called burning the PROM.

2.EPROM:

- ❖ Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM, but the content can be erased using ultraviolet rays.
- ❖ EPROM retains its contents until it is exposed to ultraviolet light.
- ❖ The ultraviolet light clears its contents, making it possible to reprogram the memory.
- ❖ An EPROM differs from a PROM, PROM can be written only once and cannot be erased.
- ❖ EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

3.EEPROM:

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

CHAPTER – 4 THEORETICAL CONCEPTS OF OPERATING SYSTEM

1. Explain the concept of a Distributed Operating System along with its advantages. **[M-2019, M-2024]**

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

Advantages :

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

2. List out the points to be noted while creating a user interface for an Operating system. **[M-2019, J-2024]**

❖ 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. **[M-2020, M-2023]**

❖ Process management is function that includes creating and deleting processes (program) and providing mechanisms for processes to communicate and synchronize with each other.
❖ A system task, such as sending output to a printer or screen, can also be called as a Process.

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

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

1.FIFO (First In First Out)Scheduling:

❖ This algorithm is based on queuing technique.
❖ 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 (row).

Example:

❖ Assume that a student is standing in a queue (Row) to get grade sheet from his/her teacher, according to the order of the queue that is first in first out.

2.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.

3.Round Robin Scheduling :

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

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.

4.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.

1. List out the uses of operating system **[M-2020, J-2023]**

❖ The main use of Operating System is to ensure that a computer can be used to extract what the user wants it do.
❖ Easy interaction between the users and computers.
❖ Starting computer operation automatically when power is turned on (Booting).
❖ Controlling Input and Output Devices
❖ Manage the utilisation of main memory.
❖ Providing security to user programs.

CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM

1. Explain the versions of Windows Operating System. **[M-2022, J-2024]**

Versions	Year	Specific features
Windows 1.x	1985	❖ Introduction of GUI in 16 - bit. processor ❖ Mouse was introduced as an input device.
Windows 2.x	1987	❖ Supports to minimize or maximize windows. ❖ Control panel feature was introduced with various system settings and customising options.
Windows 3.x	1992	❖ Introduced the concept of multitasking. ❖ Supported 256 colours which brought a more modern, colourful look to the interface.
Windows NT	1993	❖ Designed to act as servers in network.

Windows 95	1995	❖ Introduced Start button, the taskbar, Windows Explorer and Start menu. ❖ Introduced 32 - bit processor and focused more on multitasking.
Windows 98	1998	❖ Integration of the Web browser (Internet Explorer) with the Operating System. ❖ DOS gaming began to disappear as Windows based games improved. ❖ Plug and play feature was introduced.
Windows Me	2000	❖ It introduced automated system diagnostics and recovery tools.
Windows 2000	2000	❖ Served as an Operating System for business desktop and laptop systems. ❖ Four versions of Windows 2000 were released: Professional (for business desktop and laptop systems), Server (both a Web server and an office server), Advanced Server (for line-of-business applications) and Data Centre Server (for high-traffic computer networks).
Windows XP	2001	❖ Introduced 64-bit Processor. ❖ Improved Windows appearance with themes and offered a stable version.
Windows Vista	2006	❖ Updated the look and feel of Windows.
Windows 7	2009	❖ Booting time was improved, ❖ Introduced new user interfaces like Aero Peek, pinning programs to taskbar, handwriting recognition etc. and Internet Explorer 8
Windows 8	2012	❖ Windows 8 is faster than previous versions of Windows. ❖ Start button was removed. ❖ Windows 8 takes better advantage of multi-core processing, solid state drives (SSD), touch screens and other alternate input methods. ❖ Served as common platform for mobile and computer.
Windows 10	2015	❖ Start Button was added again. ❖ Multiple desktop. ❖ Central Notification Center for App notification and quick actions. ❖ Cortana voice activated personal assistant.

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

To find a file or folder:

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

Searching Files or folders using Computer icon:

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

3. Write 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 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.

1. Explain the parts of Windows in windows operating System. [S-2022]

1.Application Window:

- It is an area on a computer screen with defined boundaries, and within which information is displayed. Such windows can be resized, maximised, minimised, placed side by side, overlap, and so on.
- An Application Window contains an open application i.e. current application such as Word or Paint.
- When two or more windows are opened, only one of them is active and the rest are inactive.
- The Application Window of Open Office Writer and the appearance of the Multiple Windows opened (overlapped) in the Desktop.

2.Document Window:

- A document window is a section of the screen used to display the contents of a document.

CHAPTER – 6 SPECIFICATION AND ABSTRACTION

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

Answer:

- ❖ Let us name the algorithm hypotenuse.
- ❖ It takes number as the input.
- ❖ Let us name the input S1, S2 should not be negative.
- ❖ It produce the Hypotenuse of S1, S2 as the output.
- ❖ Let us name the output L. Then S1, S2 should be the square of L.

Now the specification of the algorithm is

Hypotenuse (S1, S2)
--Inputs : S1 and S2 are real numbers or integers
--Outputs : L is a real number such that L^2=$S1^2$+$S2^2$

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

Answer:

Quadratic_ solve (a, b, c)
-- **inputs :** a, b, c all are real numbers, a≠0.
-- **outputs:** x is a real number.

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

Answer:

- ❖ Let us name the algorithm exchange.
- ❖ It takes number as the input.
- ❖ Let us name the input a, b. a, b should not be zero.
- ❖ It produce the exchange of a, b by the using third variable t as the output.
- ❖ Let us name the output. Then a, b, t, should be exchange of the drinks.

Now the specification of the algorithm is

Exchange (a, b)
--inputs : a, b are integers, a≠0, b≠0
--Outputs : a, b are integers,
t:=a
a:=b
b:=t

1. Write the specification of an algorithm for computing the square root of a number [M-2022]

- ❖ Let us name the algorithm square_ root
- ❖ It takes the number as the input. Let us the name the input n. n should not be negative.
- ❖ It produces the square root of n as the output. Let us name the output y.
- ❖ Then n should be the square of y.

The specification of the algorithm is,

square_ root(n)
- - inputs: n is a real number, n ≥ 0.
- - outputs : y is a real number such that y^2 = n.

CHAPTER – 7 COMPOSITION AND DECOMPOSITION

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

Answer:

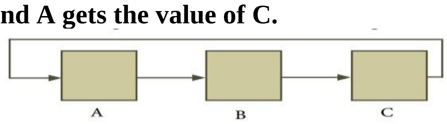
Now the specification of the algorithm is

- ❖ Let us name the algorithm exchange.
- ❖ It takes number as the input.
- ❖ Let us name the input a, b. a, b should not be zero.
- ❖ It produce the exchange of a, b by the using third variable t as the output.
- ❖ Let us name the output. Then a, b, t, should be exchange of the drinks.

Exchange (A, B)

```
--inputs   : A, B are integers, A≠0, B≠0
--Outputs : a, b are integers,
                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.**



<u>Specifications:</u>

```
1. Circulate (A, B, C)
2. -- inputs  : A, B, C all are real numbers
2. -- outputs: A, B, C all are real numbers
        T:=C
        C:=B
        B:=A
        A:=T
```

<u>Algorithm:</u>

```
1.circulate (A, B, C)
2. T:=C
3. C:=B
4. B:=A
5. A:=T
```

[OR]

```
Circulate (A, B, C)
--inputs: A,B,C are real numbers
  A≠0, B≠0, C≠0
--outputs: t1:=B; t2:=C Such that
  B:=A
  C:=t1
  A:=t2
```

3. **Decanting problem. You are given three bottles of capacities 5 , 8, and 3 liters. 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.**

<u>Answer:</u>

To divide the oil equally in the oil bottle, the following steps are needed:

Initially the contents of 3 bottles 8L, 5L &3L are (8,0,0)

- Pour 5L of oil into the second bottle (3, 5, 0)
- Pour 3L from the second bottle to the third (3, 2, 3)
- Pour 3L from the third to the first (6,2,0)
- Pour all 2L from the second to the third bottle (6,0,2)
- Pour 5L from the first to the second bottle (1, 5, 2)
- Pour 1L from the second to the third bottle (1, 4, 3)
- Finally, pour now all 3L from the third bottle to the first (4, 4, 0)

<u>Sequence of assignment statements:</u>

1. E,F,T:=8,0,0
2. E,F,T:=3,5,0
3. E,F,T:=3,2,3
4. E,F,T:=6,2,0
5. E,F,T:=6,0,2
6. E,F,T:=1,5,2
7. E,F,T:=1,4,3
8. E,F,T:=4,4,0

[OR]

```
1. A:=8, B:=0, C:=0
2. E, F, T:=A,B,C
3. F:=E-3
4. T:=F-3

5. E:=E+T
6. T:=F
   F:=F-2
7. F:=E-1
8. F:=F-1
   T:=T+1
9. E:=E+T
   T:=T-3
```

```
  E  F  T
1.8,  0,  0
2. 3, 5,  0
3. 3, 2,  3
   3+3
4. 6  2   0
  E  F  T
  6, 2,  0
  1, 5,  2
  1, 4,  3
  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   **[M-2019]**

<u>Algorithm trace:</u>

Iteration	f=f * i	i = i + 1	Condition while i ≤ n		Factorial(4) i=1, f=1; =f=2x3 = f=1x1 =f=6x4
0	1	1	1 ≤ 4 True		
1	1x1=1	1+1=2	2 ≤ 4 True		

2	1x2=2	2+1=3	3 ≤ 4 True	**[OR]**	=f=1x2 =f=24
3	2x3=6	3+1=4	4 ≤ 4 True		
4	6x4=24	4+1=5	5 ≤ 4 True		

1. Explain case analysis with an example [AUG-2022]

- ❖ Alternative statement analyses the problem into two cases.
- ❖ Case analysis statement generalizes it to multiple cases.
- ❖ Case analysis splits the problem into an exhaustive set of disjoint cases.
- ❖ For each case, the problem is solved independently.
- ❖ 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**
- ❖ The conditions C1, C2, and C3 are evaluated in turn.
- ❖ For the first condition that evaluates to true, the corresponding statement is executed, and the case analysis statement ends.
- ❖ If none of the conditions evaluates to true, then the default case S4 is executed.
- ❖ The cases are exhaustive: at least one of the cases is true.
- ❖ If all conditions are false, the default case is true.
- ❖ The cases are disjoint: only one of the cases is true.
- ❖ Though it is possible for more than one condition to be true, the case analysis always executes only one case, the first one that is true.
- ❖ If the three conditions are disjoint, then the four cases are (1) C1, (2) C2, (3) C3, (4) (not C1) and (not C2) and (not C3).

CHAPTER – 8 ITERATION AND RECURSION

1. Assume an 8 × 8 chessboard with the usual colouring. "Recoloring" operation changes the colour of all squares of a row or a column. You can recolor repeatedly.

The goal is to attain just one black square. Show that you cannot achieve the goal.

<u>Answer:</u>

In a chess board no .of squares in any row or column =8

Total no .of squares = 8x8=64

No .of block squares = 32

No .of white squares =32

Let no .of blacks in a selected recoloring row or column = b

No .of black squares after recoloring operation = 8-b

Initial state b =32

Desired state b=1

Let us tabulate all the possible outcomes after recoloring a row or column .

No .of Block squares in a row or column Before recoloring (b)	No .of Block squares in a row or column Before recoloring (-b)	Difference =│b-(8-b)│	Difference (even or odd)
1	7	6	even
2	6	4	even
3	5	2	even
4	4	0	**Zero (even)**
5	3	2	even
6	2	4	even
7	1	6	even

2. Power can also be defined recursively a

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

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

<u>Answer:</u>

Power (5,2) = 5 X 5 = 25

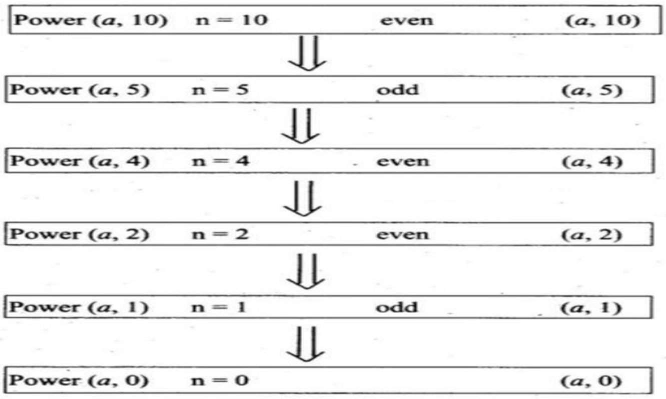
Power (a, n) raise a to the power n.

<u>Algorithm:</u>

```
Power (a,n)
--inputs: n is an integer, n ≥ 0
--Outputs: a^n
if n=0 – base case
    1
else    -- recursion step
  if (n %2!=0) – recursion step in case of  odd
    a * power (a, n-1)
else
    p = power (a, n/2) –recursion step in case of even.
```

Therefore multiply 10 times to calculate a power 10.

TO FIND a^{10}



Power (*a*, 10)	n = 10	even	(*a*, 10)
Power (*a*, 5)	n = 5	odd	(*a*, 5)
Power (*a*, 4)	n = 4	even	(*a*, 4)
Power (*a*, 2)	n = 2	even	(*a*, 2)
Power (*a*, 1)	n = 1	odd	(*a*, 1)
Power (*a*, 0)	n = 0		(*a*, 0)

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

❖ The size of the problem is n (board of size 2^nX2^n)

❖ We can solve the problem by recursion.

❖ The base case in n=1.

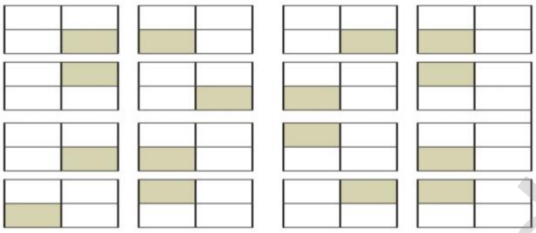
❖ It is a 2X2 corner-Covered board.

❖ We can cover it one triominoes and solve the problem.

❖ In the recursive step, divided the corner –covered board of size 2^nX2^n, into 4 sub-boards, each of size 2^{n-1}X2^{n-1}, by drawing horizontal and vertical lines through the centre of the board.

❖ Place a triominoes at the centre of the entire board so as to not cover the corner-covered sub-board, as shown in the left-most board.

❖ Now, we have four corner-covered boards, each size 2^{n-1}X2^{n-1}.



CHAPTER – 9 (PART – 1) INTRODUCTION TO C++

1. Write about Binary operators used in C++. **[M-2023]**

❖ **Binary Operators** - Require two operands

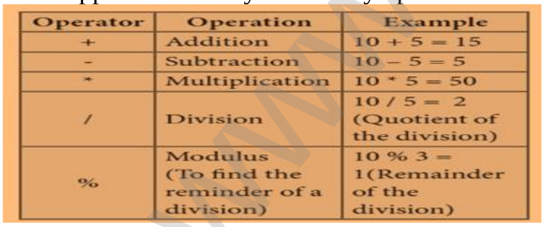
❖ C++ Operators are classified as: (1) Arithmetic Operators (2) Relational Operators (3) Logical Operators

❖ (4) Bitwise Operators (5) Assignment Operators (6) Conditional Operator

1.Arithmetic Operators:

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

❖ Support both unary and binary operators.

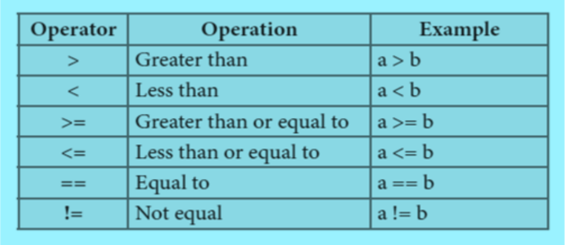


Operator	Operation	Example
+	Addition	10 + 5 = 15
-	Subtraction	10 – 5 = 5
*	Multiplication	10 * 5 = 50
/	Division	10 / 5 = 2 (Quotient of the division)
%	Modulus (To find the reminder of a division)	10 % 3 = 1(Remainder of the division)

2.Relational Operators:

❖ Relational operators are used to determine the relationship between its operands.

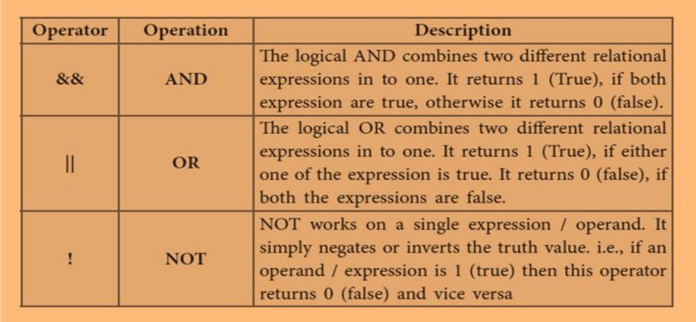
❖ When the relational operators are applied on two operands, the result will be a Boolean value i.e **1** or **0** to represents **True** or **False** respectively.



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

3.Logical Operators:

- ❖ A logical operator is used to evaluate logical and relational expressions.
- ❖ The logical operators act upon the operands that are themselves called as logical expressions.
- ❖ AND,OR both are binary operators and NOT is a unary operators.



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

4.Bitwise Operators:

- ❖ Bitwise operators work on each bit of data and perform bit-by-bit operation.
- ❖ 3 kinds of 1.Logical bitwise 2.Bitwise shift 3.One's complement

5.Assignment Operator:

- ❖ = (equal) is the assignment operator is used to assign a value on the right hand side to a variable on the left hand side.
- ❖ It is also a binary operator.

Operator	Name of Operator	Example
+=	Addition Assignment	a = 10; c = a += 5; c = 15
- =	Subtraction Assignment	a = 10; c = a -= 5; c = 5
*=	Multiplication Assignment	a = 10; c = a *= 5; c = 50
/=	Division Assignment	a = 10; c = a /= 5; c = 2
%=	Modulus Assignment	a = 10; c = a %= 5; c = 0

6.Conditional Operator:

- ❖ **?:** is a conditional Operator which is also known as Ternary operator
- ❖ This operator is used as an alternate to if … else control statement.

2. What are the types of Errors? [J-2019, M-2020, M-2022]

1. Syntax Error:

- ❖ Syntax is a set of grammatical rules to construct a program.
- ❖ Every programming language has unique rules for constructing the source code.
- ❖ Syntax errors occur when grammatical rules of C++ are violated.

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

cout << "Welcome to Programming in C++"

2.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".

3.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.

1. What are tokens in C++? Explain types of tokens with example [S-2020]

Tokens:

- ❖ The smallest individual unit in a program is known as a Token or a Lexical unit.
- ❖ C++ has the following tokens: Keywords, Identifiers, Literals, Operators, Punctuators

Types of tokens:

1. Keywords:

- ❖ Keywords are the reserved words which convey specific meaning to the C++ compiler.
- ❖ They are the essential elements to construct C++ programs.

Ex: True, False, If, Else etc

2. Identifiers:

- ❖ Identifiers are the user-defined names given to different parts of the C++ program viz. variables, functions, arrays, classes etc.,

Ex: Num ,

3. Literals (Constants):

- ❖ Literals are data items whose values do not change during the execution of a program.
- ❖ Therefore Literals are called as Constants.

4.Operators:

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

5. Punctuators:

- ❖ Punctuators are symbols, which are used as delimiters, while constructing a C++ program.
- ❖ They are also called as “Separators”.

2. Explain use of header file with an example **(Aug-2022)**

# include <iostream>

- ❖ Usually all C++ programs begin with include statements starting with a # (hash / pound).
- ❖ The symbol # is a directive for the pre-processor.
- ❖ That means, these statements are processed before the compilation process begins.
- ❖ #include <iostream> statement tells the compiler’s pre-processor to include the header file “iostream” in the program.
- ❖ The header file iostream should included 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.

CHAPTER – 10 FLOW OF CONTROL

1. Explain control statement with suitable example. **[J-2023]**

- ❖ Control statements are statements that alter the sequence of flow of instructions.
- ❖ In a program, statements may be executed sequentially, selectively or iteratively.
- ❖ Every programming languages
- ❖ Provides statements to support sequence, selection (branching) and iteration.
- ❖ If the Statements are executed sequentially, the flow is called as sequential flow.

1.Sequential 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 are always end with a semicolon (;).

2.Selection statement:

- ❖ **The selection statement** means the statement (s) are executed depends upon a condition.
- ❖ If a condition is true, a true block (a set of statements) is executed otherwise a false block is executed.
- ❖ This statement is also called **decision statement** or **selection statement.**

Example : 1.if 2.elseif 3.nested if 4.Else if ladder 5.Switch case

3.Iteration Statement:

- ❖ **Iteration Statement (looping)** is use to execute a set of statements repeatedly until a condition is satisfied.
- ❖ If a condition evaluates to true, the set of statements (true block) is executed again and again.
- ❖ This is also known as **looping statement** or iteration statement.
- ❖ As soon as the condition becomes false, the repetition stops.
- ❖ This is also known as **looping statement** or iteration statement.
- ❖ The set of statements that are executed again and again is called the **body of the loop.**
- ❖ The condition on which the execution or exit from the loop is called **exit-condition** or **test-condition.**

Example: 1.while 2.do-while 3. For

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

Entry control loop: (for loop) **[J-2019, M-2020, S-2020, J-2024]**

- ❖ The for loop is a entry- controlled loop.
- ❖ It 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)) separated by semicolons.

Syntax :

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

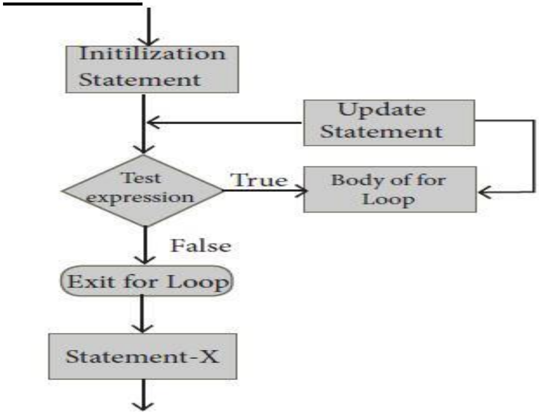
Working of for loop:

- ❖ The initialization part is used to initialize variables or declare variable which are executed only once, then the control passes to test-expression.
- ❖ After evaluation of test-expression, if the result is false, the control transferred to statement-x. If the result is true, the body of the for loop is executed, next the control is transferred to update expression.
- ❖ After evaluation of update expression part, the control is transferred to the test-expression part. Next the steps

3 to 5 is repeated.

❖ The workflow of for loop and flow chart are shown below.

Flow chart :



Example :

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

Output:

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

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

```
#include<iostream>
using namespace std;
int main( )
{
int n1,n2,a,b,gcd,lcm;
cout<<"Enter two numbers"<<endl;
cin>>n1>>n2;
a=n1;
b=n2;
while(n1!=n2)
{
if(n1>n2)
n1=n1-n2;
else
n2=n2-n1;
}
gcd=n1;
cout<<"GCD="<<gcd;
lcm=(a*b)/gcd;
cout<<"LCM="<<lcm;
}
```

Output:

```
Enter two numbers : 78    52
                  GCD : 26
```

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

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

```
#include <iostream>
int main()
{
int i,x,n,f=1,sign=1;
float sum=0,t;
cout<<""\nEnter N value";
cin>>n;
cout<<"\nEnter x value..";
cin x;
```

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

```
#include <iostream>
using namespace std;
int main()
{
int i,x,n;
float sum=0,t;
cout<<"\nEnter N value";
cin>>n;
cout<<"\nEnter x value…";
```

```
t=x;
for(i=1;i<=n;i++)
{
f=f*i;
sum=sum+sign*t/f;
t=t*x;
cout<<"SUM OF THE SERIES="<<sum;
return 0;
}
```

Output:

```
Enter N value 4
Enter x value..3
SUM OF THE SERIES = -0.375
```

```
cin>>x;
 t=x;
for(i=1;i<=n;i++)
{
 sum=sum+ t/i;
 t=t*x;
 }
 cout<<"SUM OF THE SERIES="<<sum;
 }
```

Output:

```
Enter N value 4
Enter x value..2
SUM OF THE SERIES = 10.6667
```

5. Write a program to find sum of the series. S = 1 + x + x^2 +..... + x^n [S-2020]

```
#include <iostream>
using namespace std;
int main()
{
int sum=1,x,i,t,n;
cout<<"\nEnter N value";
cin>>x;
cout<<"Enter x value…";
cin>>n;
t=x;
for(i=1;i<=n; i++)
{
sum= sum+sum+t;
t=t*x;
}
cout<<"SUM="<<sum;
}
```

Output

```
Enter N value 4
Enter x value ..2
SUM =31
```

1. Explain if else statement with example [Aug-2022]

If else:

- ❖ If else execute a set of statement is a condition evaluates to true.
- ❖ What if there is another course of action to be followed if the condition evaluates to false.
- ❖ There is another form of if that allows for this kind of either or condition by providing an else clause.

syntax

```
if ( expression)
{
True-block;
}
Else
{
False-block;
}
Statement-x
```

- ❖ In if-else statement, first the expression or condition is evaluated to either true of false.
- ❖ If the result is true, then the statements inside true-block is executed and false-block is skipped.
- ❖ If the result is false, then the statement inside the false-block is executed i.e., the true-block is skipped.

Example:

```
#include<iostream>
using namespace std;
int main()
{
int num, rem;
cout<< "\n Enter a number: ";
cin>>num;
rem = num % 2;
if (rem==0)
cout<< "\n The given number"
<<num<< " is Even";
else
cout<< "\n The given number
"<<num<< " is Odd"; return 0;
}
```

2. **What are the key differences between if… else and switch statements in C++?** **[M-2020, M-2024]**

If-else	Switch
❖ Expression inside if statement decide whether to execute the if block or under else block.	❖ Expression inside switch statement decide which case to execute.
❖ An if-else statement uses multiple statements for multiple choices	❖ Switch statement uses single expression for multiple choices.
❖ If-else statement checks for equality as well as for logical expression.	❖ Switch checks only for equality.
❖ The if statement evaluates integer, character, pointer or floating-point type or Boolean type.	❖ Switch statement evaluates only character or a integer data type.
❖ If the condition is false the else block statements will be executed	❖ If the condition is false then the default statements are executed.

3. **Explain multi way branch statement (Switch) with a suitable example** **[M-2022]**

- ❖ 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.

<u>Syntax:</u>

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

<u>Example:</u>

```
#include<iostream>
using namespace std;
int main()
{ int num;
cout << "\n Enter week day number: ";
cin >> num;
switch (num)
{
 case 1 : cout << "\n Sunday"; break;
 case 2 : cout << "\n Monday"; break;
 case 3 : cout << "\n Tuesday"; break;
 default: cout << "\n Wrong input…."; break; } }
```

4. **Explain parts of a loop** **[M-2022]**

<u>Parts of a loop:</u>

- ❖ Every loop has four elements that are used for different purposes.
- ❖ These elements are Initialization expression, Test expression, Update expression, The body of the loop

5. <u>Initialization expression(s):</u>

- ❖ The control variable(s) must be initialized before the control enters into loop.
- ❖ The initialization of the control variable takes place under the initialization expressions.
- ❖ The initialization expression is executed only once in the beginning of the loop.

<u>2. Test Expression:</u>

- ❖ The test expression is an expression or condition whose value decides whether the loop-body will be execute or not.
- ❖ If the expression evaluates to true (i.e., 1), the body of the loop gets executed, otherwise the loop is terminated.
- ❖ In an entry-controlled loop, the test-expression is evaluated before the entering into a loop whereas in an exit-controlled loop, the test-expression is evaluated before exit from the loop.

<u>3. Update expression:</u>

- ❖ It is used to change the value of the loop variable.
- ❖ This statement is executed at the end of the loop after the body of the loop is executed.

<u>4. The body of the loop:</u>

- ❖ A statement or set of statements forms a body of the loop that are executed repetitively.
- ❖ 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.
- ❖ In an exit-controlled loop, the body of the loop is executed first then the test-expression is evaluated.
- ❖ If the test-expression is true the body of the loop is repeated otherwise loop is terminated.

5. **Find the output of following program.** **[M-2022]**

```
#include<iostream>
using namespace std;
int main()
{
int num[10], even=0, odd=0;
for(int i=0; i<10; i++)
{
cout<<"\n Enter Number"<<i+1<<"=";
cin>>num[i];
if(num[i]%2==0)
```

<u>Output</u>

```
Enter number 1:4
Enter number 2:5
Enter number 3:13
Enter number 4:15
Enter number 5:18
Enter number 6: 23
Enter number 7: 34
Enter number 8: 66
Enter number 9: 77
Enter number 10: 80
```

```
++even;
Else
++odd;
}
cout<<"\n There are"<<even<<"Even Numbers";
cout<<"\n There are"<<odd<<"Odd Numbers";
}
```

```
There are 5 Even numbers
There are 5 Odd numbers
```

CHAPTER – 11 FUNCTIONS

1. Explain Call by value method with suitable example. **[M-2019, M-2020, S-2020, AUG-2022, M-2023]**

❖ Call by value method copies the value of an actual parameter into the formal parameter of the function.

❖ In this case, changes made to formal parameter within the function will have no effect on the actual parameter.

Example Program:

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

Output

```
Enter the Value for A : 5
The Value inside display function (a * a) : 25
The Value inside main function: 5
```

2. What is Recursion? Write a program to find GCD using recursion. **[M-2020]**

❖ A function that calls itself is known as recursive function.

❖ And, this technique is known as recursion.

Example Program:

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

❖ Returning from the function is done by using the return statement.

❖ The return statement stops execution and returns to the calling function.

❖ When a return statement is executed, the function is terminated immediately at that point.

Different forms of function return:

1. The return statement 2.The returning values 3.The returning by reference

1.Return statement:

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

Syntax: return expression/variable;

Example: return(a+b); return(a); return; // to terminate the function

2.The Returning values:

- ❖ The functions that return no value is declared as void.
- ❖ The data type of a function is treated as int, if no data type is explicitly mentioned.

Example : int add (int, int); add (int, int);

- ❖ In both prototypes, the return value is int, because by default the return value of a function is of type int when no return value is explicitly given.

Returning Non-integer values :

- ❖ A string can also be returned to a calling statement.

```
#include<iostream>
#include<string.h>
using namespace std;
char *display()
{
return (“chennai”);
}
int main()
{
char s[50];
strcpy(s,display());
cout<<”\nExample:Function with Non Integer Return”<<s;
return(0);}
```

Output : Example: Function with Non Integer Return Chennai

4. Explain scope of variable with example. **[M-2020]**

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

1.Local Scope:

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

2.Function Scope:

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

3.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:

```
#include<iostream>
using namespace std;
void main ( )
{
Int b=20;     b- function scope
If(a>b)
{
int t;         t - Local variable
a=b;
b=t;
}
}
```

4.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.

5. **Write a program to accept any integer number and reverse it. [J-2024]**

```
#include <iostream>
using namespace std;
int reverse(int num)
{
int r=0,d;
while(num >0)
{
d=num%10;
r=r*10+d;
num=num/10;
}
return(r);
}
int main()
{
int x;
cout<<"\nEnter a number";
cin>>x;
cout<<"\nReverse of the number is"<<reverse(x);
return 0;
}
```

Output

```
Enter a  number: 1234
Reverse of the number is: 321
```

1. **Write the output of the following program. [M-2023]**

```
#include<iostream>
using namespace std
int main ()
{
Char  dev[5][10]="{"Monitor","Speaker", "Printer","Scanner","Keyboard"};
for(int i=0; i<5; i++)
cout<<dev[i]<<"\n";
}
```

Output

```
Monitor
Speaker
Printer
Scanner
Keyboard  (or)
Error (or)
Relevant error message
```

2. **Write a short note bon pow () in C++. [J-2023 (II)]**

- ❖ The **pow()** function returns base raised to the power of an 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: 1.**base** - the base value 2.**exponent** - exponent of the base

3. **What is parameter and List its types (J-2023 (I))**

Parameter:

- ❖ Parameters are the means to pass values from the calling function to the called function.

Types: 1.Farmal parameters 2.Actual parameters

Formal parameters:

- ❖ The variables used in the function definition as parameters are known as formal parameters.

Actual parameters:

- ❖ The constants, variables or expressions used in the function call are known as actual parameters.

CHAPTER – 12 ARRAYS AND STRUCTURES

1. **Write a C++ program to find the difference between two matrixes. [J-2019]**

```
#include<iostream>
using namespace std;
int main()
{
int i,j,A[10][10],B[10][10],m,n;
cout<<"Enter number of rows"<<endl;
cin>>m;
```

```
cout<<”Enter number of columns”<<endl;
cin>>n;
cout<<”Enter the elements of A matrix”<<endl;
for(i=0;i<m;i++)
{
for(j=0;j<n;j++)
{
cin>>A[i][j];
}
}
cout<<”Enter the elements of B matrix”<<endl;
for(i=0;i<m;i++)
{
for(j=0;j<n;j++)
{
cin>>B[i][j];
}
}
cout<<”The differences between the matrices”<<endl;
{
for(i=0;i<m;i++)
{
for(j=0;j<n;j++)
cout<< (A[i][j]-B[i][j]<<”s/t”
}
cout<<”/n”;
}
}
```

2. **Write a C++ program to add two distances using the following structure definition**
struct Distance
{
int feet; float inch
}
d1 , d2, sum;

<u>Answer:</u>

```
#include <iostream>
using namespace std;
struct Distance
{
int feet;
float inch;
}
d1 , d2, sum;
int main()
{
cout << "Enter 1st distance" << endl;
cout << "Enter feet: ";
cin >> d1.feet;
cout << "Enter inch: ";
cin >> d1.inch;
cout << "\nEnter information for 2nd distance" << endl;
cout << "Enter feet: ";
cin >> d2.feet;
cout << "Enter inch: ";
cin >> d2.inch;
sum.feet = d1.feet+d2.feet;
sum.inch = d1.inch+d2.inch;
if(sum.inch > 12)
{
++ sum.feet;
sum.inch -= 12;
}
cout << endl << "Sum of distances = " << sum.feet << " feet " << sum.inch << " inches";
return 0;
}
```

<u>Output:</u>

```
Enter 1st distance
Enter feet: 6
Enter inch: 3.4
Enter information for 2nd distance
Enter feet: 5
Enter inch: 10.2
Sum of distances = 12 feet 1.6 inches
```

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

```
#include<iostream>
#include<stdio>
#include <string>
#include<conio>
using namespace std;
struct books {
char name[20], author[20];
} a[50];
int main()
{  clrscr();
cout<< "Details of Book No " << 1 << "\n";
cout<< "------------------------\n";
cout<< "Book Name :"<<strcpy(a[0].name,"Programming ")<<endl;
cout<< "Book Author :"<<strcpy(a[0].author,"Dromy")<<endl;
cout<< "\nDetails of Book No " << 2 << "\n";
cout<< "------------------------\n";
cout<< "Book Name :"<<strcpy(a[1].name,"C++programming" )<<endl;
cout<< "Book Author :"<<strcpy(a[1].author,"BjarneStroustrup ")<<endl;
cout<<"\n\n";
cout<< "==================================================\n";
cout<< " S.No\t| Book Name\t|author\n";
cout<< "==================================================";
for (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: 1234567822
```

5. **Debug the error in the following program**

```
#include <istream.h>
structPersonRec
{
charlastName[10];
chaefirstName[10];
int age;
}
PersonRecPeopleArrayType[10];
void main()
{
PersonRecord people;
for (i = 0; i < 10; i++)
{
cout<<people.firstName<< ‘ ‘ <<people.lastName <<people.age;
}
```

CORRECT CODE

```
#inculde<iostrteam>
struct PersonRec
{
char lastName[10];
char firstName[10];
int age;
};
PersonRec People[10];
void LoadArray(PeopleRec peop[10]);
void main()
{
PersonRec people[10];
for (i=0;i<10;i++)
{
cout<<people[i].firstname<<’’<<people[i].lastNane<<setw[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>> people[i].age;}
}
```

```
people[i].age;
 }
 }
LoadArray(PersonRec peop[10]
{
for (int i=0;i<10;i++)
{
 cout<<"Enter first name:";
 cin>>people[i].firstName;
 cout<<"Enter last name:";
 cin>>people[i].lastName;
 cout<<"Enter age:";
 cin>>people[i].age;
 }
 }
```

1. **i) What is structure .What is its use? [M-2020]**

❖ 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.

Use:

❖ The structure provides a facility to store different data types as a part of the same logical element in one memory chunk adjacent to each other.

ii) Write the syntax and an example for structure.

Syntax:

```
struct structure_name
{
type member_name1; type member_name2;
}
reference_name;
```

Example:

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

iii) How to access members of a structure? Give example.

❖ Once the two objects of student structure type are declared, their members can be accessed directly.

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

Syntax is: Object name . Member

For example:

```
struct Student
{
  longrollno; int age;
  float weight;
}
balu, frank;
```

The elements of the structure Student can be accessed as follows:

balu.rollno balu.age balu.weight frank.rollno rank.age frank.weight.

2. **Debug the following C++ program [M-2019]**

```
#include<iostream>
#include<string>
Class Employee
private
   char name[20];
   int code;
public:
   void getdata();
   void display();
};
Class staff:public Employee
{
int ex;
public:
void get();
void display();
};
void Employee::display();
```

Error Coding	Corrected Coding
----	using name space std;
Class Employee	class Employee
private	private :
Class staff : Public Employee	class staff : public Employee
void get ( );	void getdata();
cin >> exp ;	cin >> ex;
void staff :: Display ( )	void staff :: display ()
staff s	staff s;
S.getdata( )	s.getdata( )
};	}

```
cout<<"Name: "<<name;
cout<<"Code: "<<code;
}
void Employee::getdata()
{
cout<<"Name: ";
gets(name);
cout<<"Code: ";
cin>>code;
}
void staff::getdata()
Employee::getdata();
cout<<"Experience:";
cin>>exp;
}
void staff::Display()
{
Employee::display();
cout<<"Experience :"<<ex<<" years"<<end
}
void main()
{
staff s
cout<<"Enter data"<<endl;
S.getdata()
cout<<"Display data"<<endl;
s.display(); return 0;
};
```

3. **Debug the following C++ program** **(J-2023)**

```
%include (iostream)
using namespace std
int main [ ]
{
int n,num, digit, rev =0
cout<<"Enter a 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;
}}
```

Correct code

```
#include <iostream>
using namespace std;
int main()
{
int n,num, digit, rev =0;
cout<<"Enter a 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;
}
```

CHAPTER – 13 OBJECT ORIENTED PROGRAMMING TECHNIQUES

1. **Write the differences between Object Oriented Programming and procedural programming.** **[J-2019]**

Procedural Programming.	**Object Oriented Programming**
❖ It deals with algorithms	❖ It deals with data
❖ Programs are divided into functions	❖ Programs are divided into objects
❖ Less secure	❖ More secure
❖ It is top down approach	❖ It is bottom down approach
❖ All data items are global.	❖ Data abstraction is introduced.
❖ Emphasizes on algorithm.	❖ Emphasizes on data rather than algorithm.
❖ Overloading is not possible	❖ Overloading is possible
❖ Implement programs in the form of sub programs.	❖ Implement programs using classes and objects.
Ex: C,VB,COBOL, FORTRAN	Ex: C++, JAVA, VB.NET,PYTHON

2. **What are the advantages of OOPS?** **[M-2020, S-2020, M-2022, J-2024]**

1. Re-usability:

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

2. Redundancy:

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

3. Easy Maintenance:

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

4. Security:

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

3. **Write a note on the basic concepts that supports OOPs? (OR)** **[M-2019, M-2020, S-2020, J-2023]**
What are the main features of OOPS?

1.Encapsulation:

- ❖ The mechanism by which the data and functions are bound together into a single unit is known as Encapsulation.
- ❖ Encapsulation is about binding the data variables and functions together in class. It can also be called data binding.

2.Data Abstraction:

- ❖ Abstraction refers to showing only the essential features without revealing background details.
- ❖ Classes use the concept of abstraction to define a list of abstract attributes and function which operate on these attributes.
- ❖ They encapsulate all the essential properties of the object that are to be created.
- ❖ The attributes are called data members because they hold information.
- ❖ The functions that operate on these data are called methods or member function.

3.Modularity:

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

4.Inheritance:

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

5.Polymorphism:

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

CHAPTER – 14 CLASSES AND OBJECTS

1. **Mention the differences between constructor and destructor.** **[M-2023]**

Constructor	Destructor
❖ The name of the constructor must be same as that of the class.	❖ The destructor has the same name as that class prefixed by the tilde character '~'.
❖ No return type can be specified for constructor.	❖ It has no return type
❖ A constructor can have parameter list.	❖ The destructor cannot have arguments.
❖ The constructor function can be overloaded.	❖ Destructors cannot be overloaded.
❖ They cannot be inherited but a derived class can call the base class constructor.	❖ They cannot be inherited
❖ The compiler generates a constructor, in the absence of a user defined constructor.	❖ In the absence of user defined destructor, it is generated by the compiler.
❖ The constructor is executed automatically when the object is created.	❖ The destructor is executed automatically when the control reaches the end of class scope to destroy the object.
❖ Allocated memory space for the object	❖ Destroy the object

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

Private members:

Rno // Data member to store room number
Name //Data member to store user name
Charges //Data member to store per day charge
Days //Data member to store the number of days
Compute( )/*A function to calculate total amount as Days * Charges and if the total amount exceeds 11000 then total amount is 1.02 * Days *Charges */

Public member:

GetInfo( ) /* Function to Read the information like name , room no, charges and days*/
DispInfo( ) /* Function to display all entered details and total amount calculated using COMPUTE function*/

Answer:

```
#include<iostream>
using namespace std;
class RESORT
```

Output:

```
Enter  customer name : YUVA SAKTHI
Enter charges per day : 1500
Enter no of days : 3
```

```
{
private:
int Rno, Days, charges;
char Rname[20];
int compute()
{
if ( Days * Charges > 11000 )
return ( Days * Charges * 1.02 );
else
return ( Days * Charges);
}
public:
GetInfo()
{
cout<< “\n Enter customer name :”;
cin>>Rname;
cout<< “\n Enter charges per day:”;
cin>>Charges;
cout<< “\n Enter Number of days:”;
cin>>Days;
cout<< “\n Enter Room Number:”;
cin>>Rno;
}
dispinfo()
{
cout<< “\n Room Number:” <<Rno;
cout<< “\n Customer name:” <<Rname;
cout<< “\n Charges per day:” <<Charges;
cout<< “\n Number of days:” <<Days;
cout<< “\n Total Amount:” <<compute();
}
};
Int main()
{
RESORT S;
S.getinfo();
S.dispinfo();
}
```

```
Enter room no : 101
Customer name : YUVA SAKTHI
Charges per day: 1500
Number of days :3
Total Amount : 4500
```

3. **Write the output of the following. [M-2024]**

```
#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
```

1. Write the output for the following program **[M-2019]**

```
#include<iostream>
using namespace std;
class nest;
{
int x1;
int square_num()
{
return x1*x1;
}
public:
void input_num()
{
cout<<"\n Enter the number";
cin>>x1;
}
int cube_num()
{
return x1*x1*x1;
}
void disp_num()
{
int sq=square_num()
int cu= cube_num()
cout<<"\n The square of "<<x1<<"is"<<sq;
cout<<"\n The cube of "<<x1<<"is"<<cu;
}
};
int main()
{
nest n1;
n1.input_num();
n1.disp_num();
return 0;
}
```

Output

```
Enter the number 2
The square of 2 is 4
The cube of 2 is 8
```

2. Write the output of the following. **[J-2019]**

```
# include <iostream>
# include <conio>
using namespace std
class add
{
int a,b;
public:
int sum;
void getdata()
{
a=5;
b=10;
sum = a+b;
}
} a1;
add a2;
int main()
{
add a3;
a1.getdata();
a2.getdata();
a3.getdata();
cout<<a1.sum;
cout<<a2.sum;
cout<<a3.sum; return 0; }
```

Output

```
151515
```

3. Debug the following program (S-2020)

	Correct Code
1. #include <stream>	1.# include <iostream>
2. using namespace std:	2.**using namespace** std;
3. classes Box	3.**class** Box
4. {	4.{
5. double width;	5.double width;
6. public::	6.**public:**
7. double length;	7. double length;

	8. int printWidth()	8.void printWidth( )
	9. {	9. {
	10. cout<<"\nThe width of the box is :"<<<width;	10. cout<<"\n The width of the box is..."<<width;
	11. cout<<"\nThe length of the box is :"<<iength;	11. cout<<"\n The length of the box is..."<<length;
	12. }	12. }
	13. void setWidth(double w,l);	13. **void** setWidth(double w);
	14. }	14. };
	15. void Box?:setWidth(double w,double	15. **void** Box :: setWidth(double w)
	16. {	16. {
	17. width=w;	17. width=w;
	18. length=1;	18. }
	19. }	19. **int** main()
	20. int MAIN()	20. {
	21. {	21. Box b;
	22. Box obj;	22. b.setWidth(67.0,20.0);
	23. b.setWidth(67.0,20.0);	23.b.printWidth();
	24. b.print Width();	24. return 0;
	25. exit 0;	25. }
	}	

4. **Write the output for the following C++ program.** **[S-2020]**

```
#include<iostream>
using namespace std;
class Trial
int x;
public:
void assign(int y)
{
x=y;
}
void test(Trial obj1,Trial obj2)
{
obj1.x=10;
obj2.x=20;
cout<<"\nValue of Object1 :"<<obj1.x;
cout<<"\nValue of Object2 :"<<obj2.x;
}
void display()
{
cout<<x;
}
};
int main()
{
Trial a1, a2,a3;
a2.assign(45);
a1.assign(54);
cout<<"\nValue of first assignment:";
a2.display();
cout<<"\nValue of second assignment:";
a1.display();
a3.test(a1, a2);
cout<<"\nValue of first assignment after passing the values:";
a2.display();
cout<<"\nValue of second assignment after passing the values:";
a1.display();
return 0;
```

Output

```
Value of Object1  10
Value of Object2  20
Value of first assignment 54
Value of second assignment 45
Value of first assignment after passing the values  64
Value of second assignment after passing the values 65
```

CHAPTER – 15 POLYMORPHISM

1. What are the rules for operator overloading? (OR) [M-2020, AUG-2022, J-2023, J-2024]

Restrictions on Operator Overloading

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

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

```
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
};
```

Answer:

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

2) Which concept is illustrated by Function3? Function 3 is destructor.
When is this function called/ invoked? Destructor gests executed, when object goes out of scope.

3) What is the use of Function3? To remove the memory space of the object allocated by the constructor at the time of creating object.

4) Write the statements in main to invoke function1 and function2
Function 1 invoke → **Book()** constructor function automatically when object b Created.
Function 2 invoke → **display (float C)** function passing a float value.

5) Write the definition for Function4

```
Book :: Book(int SC,char S [ ],float F)   // function 4
{
 fees=F;
 BookCode=SC;
 strcpy (Bookname, S);
 }
```

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)
```

Output:

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

```
{
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; }
```

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; }
```

1) **Mention the objects which will have the scope till the end of the program**
ob,ob1

2) **Name the object which gets destroyed in between the program**
Ob

3) **Name the operator which is over loaded and write the statement that invokes it.**
Operator overloaded is: = = ; Invoke the statement is: ob = = ob1

4) **Write out the prototype of the overloaded member function**
void operator ==(comp);

5) **What types of operands are used for the overloaded operator?**
User defined data type

6) **Which constructor will get executed in the above program?**
Default constructor generated by compiler.

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

Output

```
Enter First String: TEXT
Enter Second String:  BOOK
Strings are not equal
```

1. **What is function overloading? What are the rules for function overloading? [M-2024]**

Function overloading:

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

Rules for function overloading: **[J-2023(B)]**

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

2. **What are the rules for function overloading? [-2023 (B)]**

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

3. **Write the output of the following program. [M-2020]**

Assume the values for age as 23, height as 161.5 and weight as 45.

```
#include <iostream>
using namespace std;
struct Student
int age;
float height, weight;
}obj;
int main()
{
cout<<"\nEnter the age :";
cin>>obj.age;
cout<<"\nEnter the height:";
cin>>obj.height;
cout<<"\nEnter the weight:";
```

Output

```
Enter the age: 23
Enter the height: 161.5
Enter the weight: 45
Your details:
Age : 23
Height : 161.5 Weight : 45
```

```
cout<<"\nYour details :";
cout<<"\nAge :"<<obj.age;
cin>>obj.weight; cout<<"\nHeight :"<<obj.height;
cout<<"\tWeight :"<<obj.weight; salai
return 0;
}
```

4. Debug the following program (M-2020)

```
?include<iostream>
using namespace std
class sum
{
int a,s;
protected:
int b,
publicly:
void sum()
{
a=b=s=0;
cout<<"\nSum Constructor :";
}
void input();
{
cout<<"\nEnter the values for a and b :";
cin>>a>>b;
}
void addition()
{
s=a+b;
cout<<"\nThe sum of two numbers is :"<<s;
}
void minus()
{
return a-b;
}
+sum()
{
cout<<"\nSum Destructor:";
} };
class difference # public sum
{
int d1; public:
difference()
{
d=0;
cout<<"\nDifference Constructor:";
}
void sub()
{
input();
d=minuses();
cout<<"\nThe difference of two numbers are :"<<d;
}
~difference()
{
cout<<"\nDifference Destructor:";
}
};
int main[]
{
difference obj;
int ch=0;
cout<<"\n1. Add :\n\n2.Difference:";
cout<<"\n\nEnter your choice:";
cin>>ch;
switch(ch);
{
case '1':
obj.input();
obj.addition();
break;
case '2':
obj.sub();
break
}
return 0;};
```

Line No	Error Program	Correct Program
1	?include<iostream>	#include<iostream>
2	using namespace std	using namespace std;
7	protected:	public:
8	publicly:	public:
14	void input();	void input()
28	+sum()	~sum()
32	class difference # public sum	class difference : public sum
34	int d1;	int d;
44	d=minuses();	d=minus();
52	int main[]	int main()

CHAPTER – 16 INHERITANCE

1. Explain the different types of inheritance. **[J-2019, AUG-2022, M-2024]**

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

1. Single Inheritance :

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

2. Multiple Inheritance:

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

3. Hierarchical inheritance:

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

4. Multilevel Inheritance:

❖ The transitive nature of inheritance is reflected by this form of inheritance.

❖ When a class is derived from a class which is a derived class – then it is referred to as multilevel inheritance.

5. Hybrid inheritance:

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

❖ Hence, it may be a combination of Multilevel and Multiple inheritance or Hierarchical and Multilevel inheritance or Hierarchical, Multilevel and Multiple inheritance.

2. Explain the different visibility mode through pictorial representation. **[M-2020, S-2020, J-2023]**

❖ An important feature of Inheritance is to know which member of the base class will be acquired by the derived class.

❖ This is done by using visibility modes.

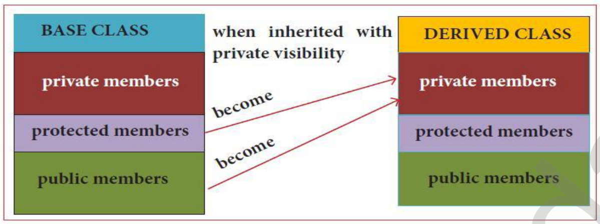
❖ The accessibility of base class by the derived class is controlled by visibility modes.

❖ The three visibility modes are private, protected and public.

❖ The default visibility mode is private.

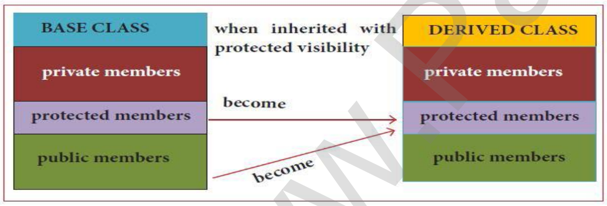
1.Private visibility mode:

❖ 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.



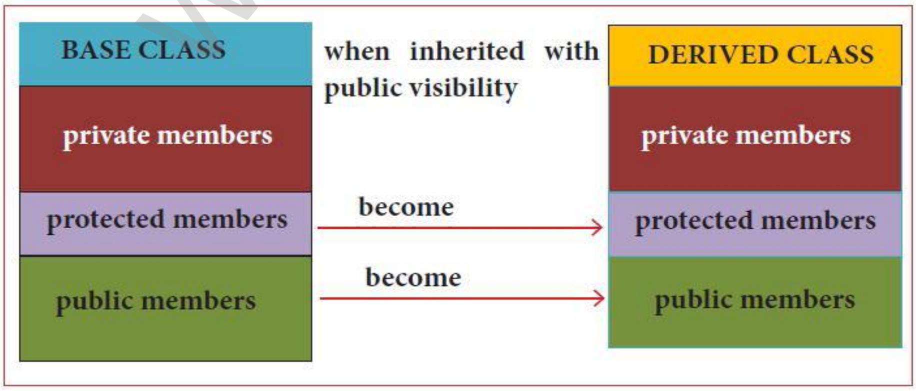
2.Protected visibility mode:

❖ 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.



3.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 [S-2020 3M]

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

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

Multilevel inheritance

3.2 **Specify the visibility mode of base classes.**

Public - Result class ; Private – Mark class

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

Constructor → Personal (), Marks (), and Result ().

Destructor → Result (), Marks (), and Personal ().

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

Base Class → Personal   Derived Class → Marks and Result

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

(a) personal : 32 (or) 25 bytes ; (b) Marks : 60 [or) 25 bytes; (c) Result : 92 [or) 29 bytes

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

Total, Agg, Grade, Final, Commence

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

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

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

Data Members	**Member Functions**
Commence	Mentry();
Grade	Mdisplay();
Total Agg	Rcalculate();
FinalGrade	Rdisplay();

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 x1, int y1)
{ x = x1;
y = y1; }
B()
{ cout<<endl<<" I am class B "<<endl; }
~B()
{ cout<<endl<<" Bye "; }
void show()
{ cout<<"x = "<<x<<endl;
cout<<"y = "<<y<<endl; } };
int main()
{A objA;
B objB(30, 20);
objB.show();
return 0; }
```

Output:

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

5. Debug the following program. **[M-2022]**

```
1.  %include(iostream.h)
2.  #include<conio.h>
3.  Class A()
4.  {
5.  public;
6.  int a1,a2:a3;
7.  void getdata[ ]
8.  {
9.  a1=15;
10. a2=13; a3=13;
11. }
12. }
13. class B:: public A()
14. {
15. PUBLIC
16. voidfunc()
17. {
18. int b1:b2:b3;
19. A::getdata[];
20. b1=a1;
21. b2=a2;
22. a3=a3;
23. cout<<b1<<'\t'<<b2<<'t\'<<b3;
24. }
25. void main()
26. {
27. B der;
28. der1:func();
29. }
```

Correct Code:

```
1.#include<iostream>
2.#include<conio.h>
3.using namespace std;
4.class A
5.{
6.public:
7.int a1,a2,a3;
8.void getdata()
9.{
10. a1=15; a2=13; a3=13;
11.}
12.};
13.class B:public A
14.{
15.public:
16.void func()
17.{
18.int b1,b2,b3;
19. A::getdata();
20. b1=a1;
21. b2=a2;
22. b3=a3;
23. cout<<b1<<'\t'<<b2<<'t\'<<b3;
24. }
25. };
26. Int main()
27. {
28. B der;
29. der.func();
30. }
```

L.n	Given code	Correct Code
1.	%include(iostream.h)	#include<iostream.h>
3.	Class A( )	Class A
5.	public;	public:
6.	int a1,a2:a3;	int a1,a2,a3;
7.	Void getdata[ ]	void getdata( )
10.	a2=13; a3=13;	a2=14; a3=13; (In order to get the given output)
12.	}	};
13.	Class B:: public A()	class B:: public A
15.	PUBLIC	public:
16.	voidfunc()	void func()
18.	int b1:b2:b3;	int b1,b2,b3;
19.	A::getdata[];	A::getdata( );
22.	a3=a3;	b3=a3;
23.	cout<<b1<<'\t'<<b2<<'t\'<<b3;	cout<<b1<<'\n'<<b2<<'\n'<<b3;
24	}	};
28	der1:func();	der:func();

6. **Debug the following C++ program.** **[M-2023]**

```
1.  #include<iostream>
2.  using namespace std;
3.  class base
4.  {
5.  public:
6.  base()
7.  {
8.  cout<<"\nConstructor of base class...";
9.  }
10. ~base()
11. {
12. cout<<"\nDestructor of base class.... ";
13. }
14. };
15. class derived:public base
16. {
17. public :
18. derived()
19. {
20. cout << "\nConstructor of derived ...";
21. }
22. ~derived()
23. {
24. cout << "\nDestructor of derived ...";
25.  }
26. };
27. class derived1 :public derived
28. {
29. public :
30. derived1()
31. {
32. cout << "\nConstructor of derived1 ...";
33. }
34. ~derived1()
35. {
36. cout << "\nDestructor of derived1 ...";
37. }
38. };
39. int main()
40. {
41. derived1 x;
42. return 0;
43. }
```

L.n	Given code	Correct Code
1.	$include<iostream>	#include<iostream.h>
3.	class base ()	class base
5.	Public	public:
10	!base	~base()
13	};	}
14	}	};
15	Class derived:: public base	class derived:public base
17	public	public:
22	!derived()	~derived()
27	Class derived1:: public derived	class derived1:public derived
30	derived1();	derived1()
34	derived1();	~derived1()
38.	}	};
39	int main():	int main()

7. **Debug the following C++ program [M-2024]**

Output:

Total area: 35

Program:

```
%include <iostream>
using namespace std:
CLASS Shape
{
Private ( )
int count
Protected;
int width;
int height;
PUBLIC;
Void setWwidth[int w]
{
width = w;
};
void setheight(int h)
{
height = h;
}
}
Class rectangle:: Public Shape
{
Public
int getarea [ ]
{
return (width * height);
};
}
int MAIN()
{
rectangle rect:
rect.  setwidth(5);
rect.setheight(7);
cout<< "Total area; "<<rect.getarea() <<endl;
return 0;
};
```

L.n	Given code	Correct Code
1	%include <iostream>	#include<iostream>
2	using namespace std:	using namespace std;
3	CLASS Shape	class Shape
5	Private ( )	private:
6	int count	int count;
7	Protected;	protected:
10	PUBLIC;	public:
11	Void setWwidth[int w]	void setwidth(int w)
14	};	}
19	}	};
20	Class rectangle:: Public Shape	class rectangle : public Shape
22	Public	public:
23	int getarea [ ]	int getarea()
26	};	}
27	}	};
28	int MAIN()	int main()
30	rectangle rect:	rectangle rect;
31	rect. setwidth(5);	rect.setwidth(5);
33	cout<< "Total area; "<<rect.getarea() <<endl;	cout<< "Total area: "<<rect.getarea() <<endl;
35	};	}

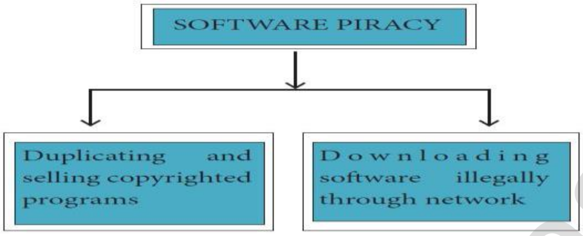
CHAPTER – 17 COMPUTER ETHICS AND CYBER SECURITY

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.
Denial of service attack	Overloading a system with fake requests so that it cannot serve normal legitimate requests.
Fraud	Manipulating data, for example changing the banking records to transfer money to an unauthorized account.
Harvesting	A person or program collects login and password information from a legitimate user to illegally gain access to others' account(s).
Identity theft	It is a crime where the criminals impersonate individuals, usually for financial gain.
Intellectual propertytheft	Stealing practical or conceptual information developed by another person or company.
Salami slicing	Stealing tiny amounts of money from each transaction.
Scam	Tricking people into believing something that is not true.
Spam	Distribute unwanted e-mail to a large number of internet users.
Spoofing	It is a malicious practice in which communication is send from unknown source disguised as a source known to the receiver.

2. What is piracy? Mention the types of piracy? How can it be prevented?

- ❖ Software Piracy is "unauthorized copying of software".
- ❖ It includes stealing of codes / programs and other information illegally and creating duplicate copies by unauthorized means and utilizing this data either for one's own benefit or for commercial profit.


SOFTWARE PIRACY
Duplicating and selling copyrighted programs
Downloading software illegally through network

1. Most of the commercial software is licensed for use at a single computer site or for use by only one user at any time.
2. When a user buys any software, he becomes a licensed user for that software.
3. He is allowed to make copies of the program for backup purposes, but it is against the law to distribute duplicate copies to others.
4. Such illegal copying and distribution of commercial software should not be practiced.

Approach to prevent software piracy:

1. An entirely different approach to software piracy is called shareware, acknowledges the futility of trying to stop people from copying software and instead relies on people's honesty.
2. Shareware publishers encourage users to give copies of programs to friends and colleagues but ask everyone who uses that program regularly to pay a registration fee to the program's author directly.
3. Commercial programs that are made available to the public illegally are often called warez.

Prevention:

- ❖ To pretended being your friend and talk to you on Internet Relay Chart (IRC) or by instant messenger, e-mail can also be a source for them.
- ❖ They may send official e-mail requesting some sensitive information.

3. Write the different types of cyber-attacks. [J-2019, M-2023]

Cyber Attack	Function
Virus	❖ A virus is a small piece of computer code that can repeat itself and spreads from one computer to another by attaching itself to another computer file. ❖ One of the most common virus is Trojan. ❖ A Trojan virus is a program that appears to perform one function but actually performs malicious activity when executed.
Worms	❖ Worms are self- repeating and do not require a computer program to attach themselves. ❖ Worms continually look for vulnerabilities and report back to the author of the worm when weaknesses are discovered.
Spyware	❖ Spyware can be installed on the computer automatically when the attachments are open, by clicking on links or by downloading infected software.
Ransom ware	❖ Ransom ware is a type of malicious program that demands payment after launching a cyber-attack on a computer system. ❖ This type of malware has become increasingly popular among criminals and costs the organizations millions each year.
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.

CHAPTER 1 TO 18 [2, 3 &5] MARK BOOK INSIDE QUESTION WITH ANSWERS

	CHAPTER – 1 INTRODUCTION TO COMPUTERS
1.	**Examples of first generation computers:** ▪ First Generation Computers - ENIAC , EDVAC , UNIVAC 1
2.	**Examples of second generation computers:** ▪ Second Generation Computers IBM 1401, IBM 1620, UNIVAC 1108
3.	**Examples of third generation computers:** ▪ Third Generation Computers IBM 360 series, Honeywell 6000 series
4.	**Mention the fifth generation computer software:** ▪ Artificial Intelligence and Expert Systems.
5.	**Fourth generation computer types:** ▪ Micro computer, Portable computer
6.	**Define IPO Cycle.** ▪ The functional components of a computer programs. ▪ Every task given to a computer follows an Input- Process- Output Cycle (IPO cycle). ▪ It needs certain input, processes that input and produces the desired output.
7.	**What is NLP?** ▪ Natural Language Processing (NLP) is a component of Artificial Intelligence (AI). ▪ It provides the ability to develop the computer program to understand human language.
8.	**What is use of VGA?** ▪ The monitor works with the VGA (Video Graphics Array) card. ▪ The video graphics card helps the keyboard to communicate with the screen. ▪ It acts as an interface between the computer and display monitor. ▪ Usually the recent motherboards incorporate built-in video card.
9.	**What is BOOTING?** ▪ When a computer is switched on, there is no information in its RAM. ▪ At the same time, in ROM, the pre-written program called POST (Power on Self Test) will be executed first. ▪ This program checks if the devices like RAM, keyboard, etc., are connected properly and ready to operate. ▪ If these devices are ready, then the BIOS (Basic Input Output System) gets executed. This process is called Booting.
10.	**What is pixels?** ▪ Pictures on a monitor are formed with picture elements called PIXELS.
11.	**Define Cold Booting:** ▪ When the system starts from initial state i.e. it is switched on, we call it cold booting or Hard Booting. ▪ When the user presses the Power button, the instructions are read from the ROM to initiate the booting process.
12.	**Define Warm Booting:** ▪ When the system restarts or when Reset button is pressed, we call it Warm Booting or Soft Booting. ▪ The system does not start from initial state and so all diagnostic tests need not be carried out in this case
13.	**Explain any five input devices.** **1.Keyboard:** ▪ Keyboard (wired / wireless, virtual) is the most common input device used today. ▪ The individual keys for letters, numbers and special characters are collectively known as character keys. ▪ This keyboard layout is derived from the keyboard of original typewriter. ▪ The data and instructions are given as input to the computer by typing on the keyboard. ▪ Apart from alphabet and numeric keys, it also has Function keys for performing different functions. ▪ There are different set of keys available in the keyboard such as character keys, modifier keys, system and GUI keys, enter and editing keys, function keys, navigation keys, numeric keypad and lock keys. **2.Mouse:** ▪ Mouse (wired/wireless) is a pointing device used to control the movement of the cursor on the display screen. ▪ It can be used to select icons, menus, command buttons or activate something on a computer. ▪ Some mouse actions are move, click, double click, right click, drag and drop. **3.Scanner:** ▪ Scanners are used to enter the information directly into the computer's memory. ▪ This device works like a Xerox machine. ▪ The scanner converts any type of printed or written information including photographs into a digital format, which can be manipulated by the computer. **4.Fingerprint Scanner:** ▪ Finger print Scanner is a fingerprint recognition device used for computer security, equipped with the fingerprint recognition feature that uses biometric technology. ▪ Fingerprint Reader / Scanner is a very safe and convenient device for security instead of using passwords, which is vulnerable to fraud and is hard to remember.

5.Track Ball:

- Track ball is similar to the upside- down design of the mouse.
- The user moves the ball directly, while the device itself remains stationary.
- The user spins the ball in various directions to navigate the screen movements.

6.Retinal Scanner:

- This performs a retinal scan which is a biometric technique that uses unique patterns on a person's retinal blood vessels.

7.Light Pen:

- A light pen is a pointing device shaped like a pen and is connected to a monitor.
- The tip of the light pen contains a light-sensitive element which detects the light from the screen enabling the computer to identify the location of the pen on the screen.
- Light pens have the advantage of ‘drawing’ directly onto the screen, but this becomes hard to use, and is also not accurate.

8.Optical Character Reader:

- It is a device which detects characters printed or written on a paper with OCR, a user can scan a page from a book.
- The Computer will recognise the characters in the page as letters and punctuation marks and stores.
- The Scanned document can be edited using a word processor.

9.Bar Code / QR Code Reader:

- A Bar code is a pattern printed in lines of different thickness.
- The Bar code reader scans the information on the bar codes transmits to the Computer for further processing.
- The system gives fast and error free entry of information into the computer.

QR (Quick response) Code:

- The QR code is the two dimension bar code which can be read by a camera and processed to interpret the image.

10.Voice Input Systems:

- Microphone serves as a voice Input device.
- It captures the voice data and send it to the Computer.
- Using the microphone along with speech recognition software can offer a completely system new approach to input information into the Computer.

11.Digital Camera:

- It captures images / videos directly in the digital form. It uses a CCD (Charge Coupled Device) electronic chip.
- When light falls on the chip through the lens, it converts light rays into digital format.

12.Touch Screen:

- A touch screen is a display device that allows the user to interact with a computer by using the finger.
- It can be quite useful as an alternative to a mouse or keyboard for navigating a Graphical User Interface (GUI).
- Touch screens are used on a wide variety of devices such as computers, laptops, monitors, smart phones, tablets, cash registers and information kiosks.
- Some touch screens use a grid of infrared beams to sense the presence of a finger instead of utilizing touch-sensitive input.

13.Keyer:

- A keyer is a device for signalling by hand, by way of pressing one or more switches.
- Modern keyers have a large number of switches but not as many as a full size keyboard.
- Typically, this number is between 4 and 50.
- A keyer differs from a keyboard, which has "no board", but the keys are arranged in a cluster.

14. Explain Output devices.

1.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.
- There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).
- The monitor works with the VGA (Video Graphics Array) card.
- The video graphics card helps the keyboard to communicate with the screen.
- It acts as an interface between the computer and display monitor.
- Usually the recent motherboards incorporate built-in video card.
- The first computer monitor was part of the Xerox Alto computer system, which was released on March 1, 1973.

2.Plotter:

- Plotter is an output device that is used to produce graphical output on papers.
- It uses single color or multi color pens to draw pictures.

3.Printers:

- Printers are used to print the information on papers. Printers are divided into two main categories:
  • Impact Printers • Non Impact printers

Impact Printers:

- 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.

- For example, Dot Matrix printers and Line matrix printers are impact printers.

Non-Impact Printers:

- These printers do not use striking mechanism for printing.
- They use electrostatic or laser technology.
- Quality and speed of these printers are better than Impact printers.
- For example, Laser printers and Inkjet printers are non-impact printers.

4.Speakers:

- Speakers produce voice output (audio) .Using speaker along with speech synthesise software, the computer can provide voice output.
- This has become very common in places like airlines, schools, banks, railway stations, etc.

5.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.

15. Types of impact printers.

1.Dot matric printer:

- A Dot matrix printer that prints using a fixed number of pins or wires.
- Each dot is produced by a tiny metal rod, also called a “wire” or “pin”, which works by the power of a tiny electromagnet or solenoid, either directly or through a set of small levers.
- It generally prints one line of text at a time.
- The printing speed of these printers varies from 30 to 1550 CPS (Character Per Second).

2.Line matrix printer:

- Line matrix printers use a fixed print head for printing. Basically, it prints a page-wide line of dots.
- But it builds up a line of text by printing lines of dots.
- Line printers are capable of printing much more than 1000 Lines Per Minute, resulting in thousands of pages per hour.
- These printers also uses mechanical pressure to print on multi-part (using carbon papers).

16. Types non-impact printers.

1.Laser Printers:

- Laser printers mostly work with similar technology used by photocopiers.
- It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern.
- It can produce very good quality of graphic images.
- One of the chief characteristics of laser printer is their resolution – how many Dots per inch (DPI).
- The available resolution range around 1200 dpi.
- Approximately it can print 100 pages per minute (PPM).

2.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 ionised ink at a sheet of paper.
- The speed of Inkjet printers generally range from 1-20 PPM (Page Per Minute).
- They use the technology of firing ink by heating it so that it explodes towards the paper in bubbles or by using piezoelectricity in which tiny electric currents controlled by electronic circuits are used inside the printer to spread ink in jet speed.
- An Inkjet printer can spread millions of dots of ink at the paper every single second.

CHAPTER – 2 (PART – 1) NUMBER SYSTEMS

1. What is bit? A bit is the short form of Binary digit which can be ‘0’ or ‘1’. It is the basic unit of data in computers.

2. What is nibble and Byte?

- A nibble is a collection of 4 bits (Binary digits).
- A collection of 8 bits is called Byte. A byte is considered as the basic unit of measuring the memory size in the computer.

3. Define – Word Length:

- Word length refers to the number of bits processed by a Computer’s CPU.
- For example, a word length can have 8 bits, 16 bits, 32 bits and 64 bits (Present day Computers use 32 bits or 64 bits)

4. What is computer memory?

- Computer memory is normally represented in terms of Kilo Byte (KB) or Mega Byte (MB).
- In decimal system, 1 Kilo represents 1000, that is , 10^3. In binary system, 1 KiloByte represents 1024 bytes that is 2^{10}.

5. Explain computer memory sizes?

Name	Abbr.	Size
Kilo	K	2^10 = 1,024
Mega	M	2^20 = 1,048,576
Giga	G	2^30 = 1,073,741,824
Tera	T	2^40 = 1,099,511,627,776
Peta	P	2^50 = 1,125,899,906,842,624
Exa	E	2^60 = 1,152,921,504,606,846,976
Zetta	Z	2^70 = 1,180,591,620,717,411,303,424
Yotta	Y	2^80 = 1,208,925,819,614,629,174,706,173

6. What are the different types of coding schemes?

- Bytes are used to represent characters in a text.
- Different types of coding schemes are used to represent the character set and numbers.
- The most commonly used coding scheme is the American Standard Code for Information Interchange (ASCII).
- Each binary value between 0 and 127 is used to represent a specific character.
- The ASCII value for (blank space) is 32 and the ASCII value of numeric 0 is 48.
- The range of ASCII values for lower case alphabets is from 97 to 122 and the range of ASCII values for the upper case alphabets is 65 to 90.

7. How the data classified based of their size?

- Bites, Nibble, Bytes and Word.

8. Decimal Number System:

- It consists of 0,1,2,3,4,5,6,7,8,9(10 digits).
- It is the oldest and most popular number system used in our day to day life.
- In the positional number system, each decimal digit is weighed relative to its position in the number.
- This means that each digit in the number is multiplied by 10 raised to a power corresponding to that digit's position.

9. Binary Number System:

- There are only two digits in the Binary system, namely, 0 and 1.
- The numbers in the binary system are represented to the base 2 and the positional multipliers are the powers of 2.
- The left most bit in the binary number is called as the Most Significant Bit (MSB) and it has the largest positional weight.
- The right most bit is the Least Significant Bit (LSB) and has the smallest positional weight.

10. Octal Number System:

- Octal number system uses digits 0,1,2,3,4,5,6 and 7 (8 digits).
- Each octal digit has its own positional value or weight as a power of 8.

11. Hexadecimal Number System:

- A hexadecimal number is represented using base 16.
- Hexadecimal or Hex numbers are used as a shorthand form of binary sequence.
- This system is used to represent data in a more compact manner.
- Since 16 symbols are used, 0 to F, the notation is called hexadecimal.
- The first 10 symbols are the same as in the decimal system, 0 to 9 and the remaining 6 symbols are taken from the first 6 letters of the alphabet sequence, A to F, where A represents 10, B is 11, C is 12, D is 13, E is 14 and F is 15.

12. Signed Magnitude:

- Computers can handle both positive (unsigned) and negative (signed) numbers.
- The simplest method to represent negative binary numbers is called Signed Magnitude.

13. Sign bit or parity bit:

- In signed magnitude method, the left most bit is Most Significant Bit (MSB), is called sign bit or parity bit.

14. Signed Magnitude representation:

- The value of the whole numbers can be determined by the sign used before it.
- If the number has '+' sign or no sign it will be considered as positive.
- If the number has '–' sign it will be considered as negative.

Example: + 43 or 43 is a positive number – 43 is a negative number

15. Binary Coded Decimal (BCD)

- This encoding system is not in the practice right now.
- This is 26 bit encoding system. This can handle 26 = 64 characters only.

16. ASCII:

- American Standard Code for Information Interchange (ASCII)
- This is the most popular encoding system recognized by United States.
- Most of the computers use this system. Remember this encoding system can handle English characters only.
- This can handle 27 bit which means 128 characters.
- In this system, each character has individual number.
- The new edition (version) ASCII -8, has 28 bits and can handle 256 characters are represented from 0 to 255 unique numbers.
- The ASCII code equivalent to the uppercase letter 'A' is 65.
- The binary representation of ASCII (7 bit) value is 1000001.
- Also 01000001 in ASCII-8 bit.

17. EBCDIC:

- Extended Binary Coded Decimal Interchange Code (EBCDIC)
- This is similar to ASCII Code with 8 bit representation.
- This coding system is formulated by International Business Machine (IBM).
- The coding system can handle 256 characters.
- The input code in ASCII can be converted to EBCDIC system and vice – versa

18. Unicode:

- This coding system is used in most of the modern computers.
- The popular coding scheme after ASCII is Unicode. ASCII can represent only 256 characters.
- Therefore English and European Languages alone can be handled by ASCII. Particularly there was a situation, when the languages like Tamil, Malayalam, Kannada and Telugu could not be represented by ASCII.
- Hence, the Unicode was generated to handle all the coding system of Universal languages.
- This is 16 bit code and can handle 65536 characters.
- Unicode scheme is denoted by hexadecimal numbers.

19. Define MSB & LSB

- The left most bit in the binary number is called as the Most Significant Bit (MSB) and it has the largest positional weight.
- The right most bit is the Least Significant Bit (LSB) and has the smallest positional weight.

20. Convert $(64.64)_{10}$ to binary:

I.Integer Part:		**II. Fractional Part:**	**Integer**	
2 64	64 = $(1000000)_2$	0.64x2= 1.28	= 1	
2 32-0		0.28x2= 0.56	= 0	**$(64)_{10}$ = $(.1000000)_2$**
2 16-0		0.56x2= 1.12	= 1	
2 8-0		0.12x2= 0.24	= 0	**$(64.64)_{10}$ = $(1000000.1010001….)_2$**
2 4-0		0.24x2 = 0.48	= 0	
2 2-0		0.48x2= 0.96	= 0	
1-0		0.96x2= 1.98	= 1	

21. 1101010_2+101101_2

```
 1 1   1
   1 1 0 1 0 1 0
       1 0 1 1 0 1
 1 0 0 1 0 1 1 1
```

CHAPTER -2 (PART – 2) BOOLEAN ALGEBRA

1. What are called logical variable?

- The results True or False are called "Truth Values".
- The truth values depicted by logical constant 1 and 0; 1 means True and 0 means False.
- The variable which can store these truth values are called "Logical variable" or "Binary valued variables" or "Boolean Variables" as these can store one of the two values of True or False.

2. Logical Operations:

- Boolean algebra makes use of variables and operations (functions).
- The basic logical operations are AND, OR and NOT, which are symbolically represented by dot (.), plus (+), and by over bar / single apostrophe respectively.
- These symbols are also called as "Logical Operators".

3. Truth Table:

- A truth table represents all the possible values of logical variable or statements along with all the possible results of given combination of truth values.

4. AND operator:

- The AND operator is defined in Boolean algebra by the use of the dot (.) operator.
- It is similar to multiplication in ordinary algebra.
- The AND operator combines two or more input variables so that the output is true only if all the inputs are true.

5. OR operator:

- The plus sign is used to indicate the OR operator.
- The OR operator combines two or more input variables so that the output is true if at least one input is true.

6. NOT operator:

- The NOT operator has one input and one output.
- The input is either true or false, and the output is always the opposite, that is, the NOT operator inverts the input.

7. NAND operator:

- The NAND is the combination of NOT and AND.
- The NAND is generated by inverting the output of an AND operator.

8. NOR operator:

- The NOR is the combination of NOT and OR.
- The NOR is generated by inverting the output of an OR operator

9. XOR Gate:

- The XOR (exclusive - OR) gate acts in the same way as the logical "either/or."
- The output is "true" if either, but not both, of the inputs are "true".
- The output is "false" if both inputs are "false" or if both inputs are "true."
- Another way of looking at this circuit is to observe that the output is 1 if the inputs are different, but 0 if the inputs are the same.

10. XNOR Gate

	▪ The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter. ▪ Its output is "true" if the inputs are the same, and "false" if the inputs are different. ▪ In simple words, the output is 1 if the input are the same, otherwise the output is 0.
	CHAPTER – 3 COMPUTER ORGANIZATION
1.	**Microprocessor units:** ▪ The microprocessor is made up of 3 main units. 1. Arithmetic and Logic unit (ALU): To perform arithmetic and logical instructions based on computer instructions. 2. Control unit: To control the overall operations of the computer through signals. 3. Registers (Internal Memory): They are used to hold the instruction and data for the execution of the processor.
2.	**Instruction Set:** ▪ Basic set of machine level instructions that a microprocessor is designed to execute is called as an instruction set.
3.	**What is Bus?** ▪ A bus is a collection of wires used for communication between the internal components of a computer.
4.	**Examples of RISC processors:** ▪ Pentium IV, Intel P6, AMD K6 and K7.
5.	**Examples of CISC processors:** ▪ Intel 386 & 486, Pentium, Pentium II and III, and Motorola 68000.
6.	**Compare bit & byte:** ▪ The smallest unit of information that can be stored in the memory is called as a **bit.** ▪ The memory can be accessed by a collection of 8 bits which is called as a **byte.**
7.	**What is the use of ports?** ▪ The Motherboard of a computer has many I/O sockets that are connected to the ports
8.	**Define silicon chip.** ▪ Silicon chip is an integrated, set of electronic circuits on one small flat piece of semiconductor material, silicon.
9.	**Define – Hertz.** ▪ Hertz – abbreviated as Hz is the standard unit of measurement used for measuring frequency. ▪ Since frequency is measured in cycles per second, one hertz equals one cycle per second. ▪ Hertz is commonly used to measure wave frequencies, such as sound waves, light waves, and radio waves.
10.	**What is USB 3.0?** ▪ USB 3.0 is the third major version of the Universal Serial Bus (USB) standard to connect computers with other electronic gadgets. ▪ USB 3.0 can transfer data up to 5 Giga byte/second.USB3.1 and USB 3.2 are also released.
11.	**Random-Access Memory (RAM)** ▪ The main memory is otherwise called as Random Access Memory. ▪ This is available in computers in the form of Integrated Circuits (ICs). ▪ It is the place in a computer where the Operating System, Application Programs and the data in current use are kept temporarily so that they can be accessed by the computer's processor. ▪ RAM is a volatile memory, which means that the information stored in it is not permanent. ▪ As soon as the power is turned off, whatever data that resides in RAM is lost. ▪ It allows both read and write operations.
12.	**Read Only Memory (ROM)** ▪ Read Only Memory refers to special memory in a computer with pre-recorded data at manufacturing time which cannot be modified. ▪ The stored programs that start the computer and perform diagnostics are available in ROMs. ▪ 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.
13.	**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. ▪ Unlike the main memory, PROMs retain their contents even when the computer is turned off. ▪ The PROM differs from ROM. ▪ PROM is manufactured as a blank memory, whereas a ROM is programmed during the manufacturing process itself. ▪ PROM programmer or a PROM burner is used to write data to a PROM chip. ▪ The process of programming a PROM is called burning the PROM.
14.	**Erasable Programmable Read Only Memory (EPROM)** ▪ Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM, but the content can be erased using ultraviolet rays. ▪ EPROM retains its contents until it is exposed to ultraviolet light. ▪ The ultraviolet light clears its contents, making it possible to reprogram the memory. ▪ An EPROM differs from a PROM, PROM can be written only once and cannot be erased. ▪ EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

15. Electrically Erasable Programmable Read Only Memory (EEPROM)

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

16. Cache Memory:

- The cache memory is a very high speed and expensive memory, which is used to speed up the memory retrieval process.
- Due to its higher cost, the CPU comes with a smaller size of cache memory compared with the size of the main memory.
- Without cache memory, every time the CPU requests the data, it has to be fetched from the main memory which will consume more time.
- The idea of introducing a cache is that, this extremely fast memory would store data that is frequently accessed and if possible, the data that is closer to it.
- This helps to achieve the fast response time, where response Time, (Access Time) refers to how quickly the memory can respond to a read / write request.

17. Explain secondary storage devices:

1.Hard Disks:

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

2.Compact Disc (CD)

- A CD or CD-ROM is made from 1.2 millimetres thick, polycarbonate plastic material.
- A thin layer of aluminium or gold is applied to the surface.
- CD data is represented as tiny indentations known as "pits", encoded in a spiral track moulded into the top of the polycarbonate layer.
- The areas between pits are known as "lands".
- A motor within the CD player rotates the disk. The capacity of an ordinary CD-ROM is 700MB.

3.Digital Versatile Disc (DVD)

- A DVD (Digital Versatile Disc or Digital Video Disc) is an optical disc capable of storing up to 4.7 GB of data, more than six times what a CD can hold.
- DVDs are often used to store movies at a better quality.
- Like CDs, DVDs are read with a laser.
- The disc can have one or two sides, and one or two layers of data per side; the number of sides and layers determines how much it can hold.
- Double-layered sides are usually gold-coloured, while single-layered sides are usually silver-coloured, like a CD.

4.Flash Memory Devices

- Flash memory is an electronic (solid-state) non-volatile computer storage medium that can be electrically erased and reprogrammed.
- They are either EEPROM or EPROM. Examples for Flash memories are pen drives, memory cards etc.
- Flash memories can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones.
- Flash memory offers fast access times.
- The time taken to read or write a character in memory is called access time.
- The capacity of the flash memories vary from 1 Gigabytes (GB) to 2 Terabytes (TB).

5.Blu-Ray Disc:

- Blu-Ray Disc is a high-density optical disc similar to DVD.
- Blu-ray is the type of disc used for PlayStation games and for playing High-Definition (HD) movies.
- A double-layer Blu-Ray disc can store up to 50GB (gigabytes) of data.
- DVD uses a red laser to read and write data.
- But, Blu-ray uses a blue-violet laser to write.
- Hence, it is called as Blu-Ray.

CHAPTER – 4 THEORETICAL CONCEPTS OF OPERATING SYSTEM

1. Explain software with types.

- A software is set of instructions that perform specific task.
- It interacts basically with the hardware to generate the desired output.

Types of Software

- Software is classified into two types: 1) Application Software 2) System Software

1.Application Software:

- Application software is a set of programs to perform specific task.
- For example MS-word is an application software to create text document and VLC player is familiar application software to play audio, video files and many more.

2.System Software:

	▪ System software is a type of computer program that is designed to run the computer's hardware and application programs. ▪ Example Operating System and compiler.
2.	**Single User Operating Systems:** ▪ An operating system allows only a single user to perform a task at a time. ▪ It is called as a Single user and single Task operating system. ▪ MS-DOS is an example for a single user and single task Operating System.
3.	**What is process:** ▪ A system task, such as sending output to a printer or screen, can also be called as a Process.
4.	**Process management categories:** ▪ Operating System processes which is executed by system code ▪ User Processes which is execute by user code
5.	**Fault Tolerance:** ▪ The Operating Systems should be robust. ▪ When there is a fault, the Operating System should not crash, instead the Operating System have fault tolerance capabilities and retain the existing state of system.
6.	**Functions of OS:** ▪ The functions of an Operating System include file management, memory management, process management and device management and many more.
7.	**List out OS:** ▪ Some of the popular Operating Systems used in personal computers and laptops are Windows, UNIX and Linux. ▪ The mobile devices mostly use Android and ioS as mobile OS.
8.	**File Management:** ▪ File management is an important function of OS which handles the data storage techniques. ▪ The operating System manages the files, folders and directory systems on a computer. ▪ The FAT (File Allocation Table) stores general information about files like filename, type (text or binary), size, starting address and access mode. ▪ The file manager of the operating system helps to create, edit, copy, allocate memory to the files and also updates the FAT. ▪ There are few other file management techniques available like Next Generation File System (NTFS) and ext2(Linux).
	CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM
1.	**Windows uses:** ▪ Windows Operating System uses both Keyboard and mouse as input devices. ▪ Mouse is used to interact with Windows by clicking its icons. ▪ Keyboard is used to enter alphabets, numerals and special characters.
2.	**Some of the functions of Windows Operating System are:** ▪ Access applications (programs) on the computer (word processing, games, spread sheets, calculators and so on). ▪ Load any new program on the computer. ▪ Manage hardware such as printers, scanners, mouse, digital cameras etc., ▪ File management activities (For example creating, modifying, saving, deleting files and folders). ▪ Change computer settings such as colour scheme, screen savers of your monitor, etc.
3.	**Windows Desktop:** ▪ The opening screen of Windows is called "Desktop".
4.	**The Icons:** ▪ Icon is a graphic symbol representing the window elements like files, folders, shortcuts etc., Icons play a vital role in GUI based applications.
5.	**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.
6.	**Shortcut Icons:** ▪ Shortcut icons can be created for any application or file or folder. ▪ By double clicking the icon, the related application or file or folder will open.
7.	**Disk drive icons:** ▪ The disk drive icons graphically represent five disk drive options. ▪ (i) Hard disk (ii) CD-ROM/DVD Drive (iii) Pen drive (iv) Other removable storage such as mobile, smart phone, tablet etc., (v) Network drives if your system is connected with other system.
8.	**Application Window:** ▪ It is an area on a computer screen with defined boundaries, and within which information is displayed. ▪ Such windows can be resized, maximised, minimised, placed side by side, overlap, and so on.
9.	**Document Window:** A document window is a section of the screen used to display the contents of a document.

10. Start Menu:

- In the lower left-hand corner of the windows screen is the Start button.
- When you click on the button, the Start menu will appear. Using the start menu, you can start any application.

11. Taskbar:

- At the bottom of the screen is a horizontal bar called the task bar.

12. Computer Icon:

- By clicking this icon, the user can see the disk drivers mounted in the system.
- In windows XP, Vista, this icon is called "My computer" in Windows 8 and 10, it is called "This PC".

13. Explain the mouse handling options.

Action	Reaction
Point to an item	Move the mouse pointer over the item.
Click	Point to the item on the screen, press and release the left mouse button.
Right click	Point to the item on the screen, press and release the right mouse button. Clicking the right mouse button displays a pop up menu with various options.
Double-click	Point to the item on the screen, quickly press twice the left mouse button.
Drag and drop	Point to an item then hold the left mouse button as you move the pointer press and you have reached the desired position, release the mouse button.

14. Elements of a window:

1.Title Bar:

- The title bar will display the name of the application and the name of the document opened.
- It will also contain minimize, maximize and close button.

2.Menu Bar:

- The menu bar is seen under the title bar.
- Menus in the menu bar can be accessed by pressing Alt key and the letter that appears underlined in the menu title.
- Additionally, pressing Alt or F10 brings the focus on the first menu of the menu bar.

3.The Workspace:

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

4.Scroll bars:

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

5.Corners and borders:

- The corners and borders of the window helps to drag and resize the windows.
- The mouse pointer changes to a double headed arrow when positioned over a border or a corner.

15. Starting and Closing Applications:

1. Click the Start button and then point to All Programs. The Program menu appears.
2. Point to the group that contains the application you want to start, and then click the application name.
3. You can also open an application by clicking Run on the Start menu, and the name of the application.
4. To quit an application, click the Close button in the upper right corner of the application window.
5. You can also quit an application by clicking on File → Exit and File → Close option in Windows 7.

16. Creating Folders:

- There are two ways in which you can create a new folder:

Method I:

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

Method II:

Step 1: In the Desktop, right click → New → Folder.
Step 2: A Folder appears with the default name “New folder”.
Step 3: Type the name you want and press Enter Key.
Step 4: The name of the folder will change.

17. Creating Files (Word pad):

1. Click Start → All Programs → Accessories → Word pad or Run → type Word pad, click OK.
2. Type the contents in the workspace and save the file using File → Save or Ctrl + S.
3. Save As dialog box will be opened.
4. In the dialog box, select the location where you want to save the file by using **look in** drop down list box.
5. Type the name of the file in the **file name** text box. 6. Click save button.

18. Finding Files and Folders:

To find a file or folder:

1. Click the **Start** button, the **search** box appears at the bottom of the start menu.

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

<u>Searching Files or folders using Computer icon:</u>

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

19. Renaming Files or Folders

- There are number of ways to rename files menu, left mouse button or right mouse button.

<u>Method 1</u> Using the FILE Menu

1. Select the File or Folder you wish to Rename.
2. Click File→ Rename.
3. Type in the new name.
4. To finalise the renaming operation, press Enter.

<u>Method 2</u> Using the Right Mouse Button

1. Select the file or folder you wish to rename.
2. Click the right mouse button over the file or folder.
3. Select Rename from the pop-up menu.
4. Type in the new name.
5. To finalise the renaming operation, press Enter.

<u>Method 3</u> Using the Left Mouse Button

1. Select the file or folder you wish to rename.
2. Press F2 or click over the file or folder. A surrounding rectangle will appear around the name.
3. Type in the new name.
4. To finalise the renaming operation, press Enter.

20. Moving Files and Folders

<u>Method I-CUT and PASTE:</u>

- Click on the **Edit** → **Cut** or **Ctrl + X** Or right **click** → **cut** from the pop-up menu.
- To move the file(s) or folder(s) in the new location, navigate to the new location and paste it using Click **Edit** → **Paste** from edit menu or **Ctrl + V** using keyboard.
- Or Right **click** → **Paste** from the pop-up menu. The file will be pasted in the new location.

<u>Method II – Drag and Drop</u>

- In the disk drive window, we have two panes called left and right panes.
- In the left pane, the files or folders are displayed like a tree structure.
- In the right pane, the files inside the specific folders in the left pane are displayed with various options.
- In the right pane of the Disk drive window, select the file or folder you want to move.
- Click and drag the selected file or folder from the right pane, to the folder list on the left pane.
- Release the mouse button when the target folder is highlighted (active).
- Your file or folder will now appear in the new area.

21. Copying Files and Folders:

<u>Method I - COPY and PASTE</u>:

- Click Edit → Copy or Ctrl + C or right click→ Copy from the pop-up menu.

<u>To paste the file(s) or folder(s) in the new location, navigate to the target location then do one of the following:</u>

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

<u>Method II – Drag and Drop:</u>

- In the right pane, select the file or folder you want to copy.
- Click and drag the selected file and/or folder to the folder list on the left, and drop it where you want to copy the file and/or folder.
- Your file(s) and folder(s) will now appear in the new area

22. Copying Files and Folders to removable disk:

- There are several methods of transferring files to or from a removable disk. • Copy and Paste • Send To

<u>METHOD I - Copy and Paste:</u>

- Plug the USB flash drive directly into an available USB port.

<u>If the USB flash drive or external drive folder does not open automatically, follow these steps:</u>

- Click Start→Computer.

- Double-click on the Removable Disk associated with the USB flash drive.
- Navigate to the folders in your computer containing files you want to transfer
- Right-click on the file you want to copy, then select Copy.
- Return to the Removable Disk window, right-click within the window, then select Paste.

METHOD II - Send To

- Plug the USB flash drive directly into an available USB port.
- Navigate to the folders in your computer containing files you want to transfer.
- Right-click on the file you want to transfer to your removable disk.
- Click Send To and select the Removable Disk associated with the USB flash drive.

23. **Deleting Files and Folders**:

- When you delete a file or folder, it will move into the Recycle Bin.

To delete a file or folder:

- Select the file or folder you wish to delete.
  1. Right- click the file or folder, select Delete option from the po-pup menu
  2. or Click File → Delete or press Delete key from the keyboard.
  3. The file will be deleted and moved to the Recycle bin.

24. **Creating Shortcuts on the Desktop**:

- 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.

25. **Shutting down or Logging off a Computer:**

- Once you have closed all open applications, you can either log off your computer or shut down the computer.
- Click start → log off (click the arrow next to Shut down) or Start → Shutdown.
- If you have any open programs, then you will be asked to close them or windows will Force shut down, you will lose any un-saved information if you do this.
- Switch User: Switch to another user account on the computer without closing your open programs and Windows processes.
- Log Off: Switch to another user account on the computer after closing all your open programs and Windows processes.
- Lock: Lock the computer while you're away from it.
- Restart: Reboot the computer. (This option is often required as part of installing new software or Windows update.)
- Sleep: Puts the computer into a low-power mode that retains all running programs and open Windows in computer memory for a super-quick restart.
- Hibernate (found only on laptop computers): Puts the computer into a low-power mode after saving all running programs and open Windows on the machine's hard drive for a quick restart

CHAPTER – 6 SPECIFICATION AND ABSTRACTION

1. **Mention three important control flow statements.**

1.Sequential control flow 2.Alternative control flow 3.Iterative control flow

2. **List the building blocks of algorithms:** 1.Data 2.Variables 3.Control flow 3.Functions

3. **What is instructions?**

- An instruction describes an action.
- When the instructions are executed, a process evolves, which accomplishes the intended task or solves the given problem.

4. **What is statements?**

- A computer can only execute instructions in a programming language.
- Instructions of a computer are also known as statements.
- Therefore, ultimately, algorithms must be expressed using statements of a programming language.

5. **Data with examples:**

- Algorithms take input data, process the data and produce output data.
- Computers provide instructions to perform operations on data.
- For example, there are instructions for doing arithmetic operations on numbers, such as add, subtract, multiply and divide.
- There are different kinds of data such as numbers and text.

6. **Variables:**

- Variables are named boxes for storing data.
- When we do operations on data, we need to store the results in variables.
- The data stored in a variable is also known as the value of the variable.
- We can store a value in a variable or change the value of variable, using an assignment statement.

7. **Control flow:**

- An algorithm is a sequence of statements.
- However, after executing a statement, the next statement to be executed need not be the next statement in the algorithm.
- The statement to be executed next may depend on the state of the process.

8. Functions:

- Algorithms can become very complex.
- The variables of an algorithm and dependencies among the variables may be too many.
- Then, it is difficult to build algorithms correctly.
- In such situations, we break an algorithm into parts, construct each part separately and then integrate the parts to the complete algorithm.
- The parts of an algorithm are known as functions.
- A function is like a sub algorithm.
- It takes an input and produces an output, satisfying a desired input output relation.

9. Initial state & final state:

- The inputs and outputs are passed between an algorithm and the user through variables.
- The values of the variables when the algorithm starts is known as the initial state and the values of the variables when the algorithm finishes is known as the final state.

10. Double dash:

- A double dash -- indicates that the rest of the line is a comment.
- Comments are statements which are used to annotate a program for the human readers and not executed by the computer.
- Comments at crucial points of flow are useful and even necessary to understand the algorithm.
- In our algorithmic notation, we use double dashes (--) to start a comment line. (In C++, a double slash // indicates that the rest of the line is a comment).

11. Specification format:

- We can write the specification in a standard three part format:
- The name of the algorithm and the inputs.
- Input: the property of the inputs.
- Output: the desired input-output relation.

12. State & Functions:

State: In algorithms, the state of a computation is abstracted by a set of variables.

Functions: When an algorithm is very complex, we can decompose it into functions and abstract each function by its specification.

13. Explain about State:

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

14. What are the control flow statements:

- There are three important control flow statements to alter the control flow depending on the state.
- In sequential control flow, a sequence of statements are executed one after another in the same order as they are written.
- In alternative control flow, a condition of the state is tested and if the condition is true, one statement is executed; if the condition is false, an alternative statement is executed.
- In iterative control flow, a condition of the state is tested and if the condition is true, a statement is executed.
- The two steps of testing the condition and executing the statement are repeated until the condition becomes false.

15. Algorithm Design Techniques:

1. Specification:

- The first step in problem solving is to state the problem precisely.
- A problem is specified in terms of the input given and the output desired.
- The specification must also state the properties of the given input and the relation between the input and the output.

2. Abstraction:

- A problem can involve a lot of details. Several of these details are unnecessary for solving the problem.
- Only a few details are essential.
- Ignoring or hiding unnecessary details and modelling an entity only by its essential properties is known as abstraction.
- For example, when we represent the state of a process, we select only the variables essential to the problem and ignore inessential details.

3. Composition:

- An algorithm is composed of assignment and control flow statements.
- A control flow statement tests a condition of the state and depending on the value of the condition, decides the next statement to be executed.

4. Decomposition:

- We divide the main algorithm into functions.
- We construct each function independently of the main algorithm and other functions.
- Finally, we construct the main algorithm using the functions.

- When we use the functions, it is enough to know the specification of the function.
- It is not necessary to know how the function is implemented.

CHAPTER – 7 COMPOSITION AND DECOMPOSITION

1. Notations for Algorithms:

- A programming language is a notation for expressing algorithms to be executed by computers.
- Pseudo code is a notation similar to programming languages.
- Algorithms expressed in pseudo code are not intended to be executed by computers, but for communication among people.
- Flowchart is a diagrammatic notation for representing algorithms.
- They give a visual intuition of the flow of control, when the algorithm is executed.

2. Programming language:

- A programming language is a notation for expressing algorithms so that a computer can execute the algorithm.
- An algorithm expressed in a programming language is called a program.
- C, C++ and Python are examples of programming languages.

3. Pseudo-code:

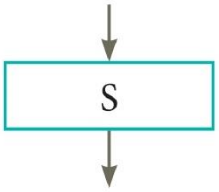
- Pseudo code is a mix of programming-language-like constructs and plain English.
- This notation is not formal nor exact.
- It uses the same building blocks as programs, such as variables and control flow.
- But, it allows the use of natural English for statements and conditions.
- An algorithm expressed as pseudo code is not for computers to execute directly, but for human readers to understand.

4. Flowcharts:

- Flowchart is a diagrammatic notation for representing algorithms.
- They show the control flow of algorithms using diagrams in a visual manner.
- In flowcharts, rectangular boxes represent simple statements, diamond-shaped boxes represent conditions and arrows describe how the control flows during the execution of the algorithm.
- A flowchart is a collection of boxes containing statements and conditions which are connected by arrows showing the order in which the boxes are to be executed.

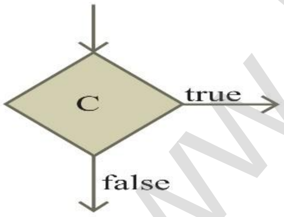
5. Statement:

- A statement is contained in a rectangular box with a single outgoing arrow, which points to the box to be executed next.



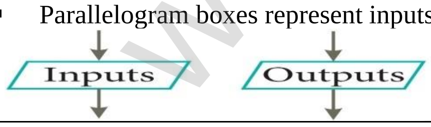
6. Condition:

- A condition is contained in a diamond-shaped box with two outgoing arrows, labeled true and false.
- The true arrow points to the box to be executed next if the condition is true, and the false arrow points to the box to be executed next if the condition is false.



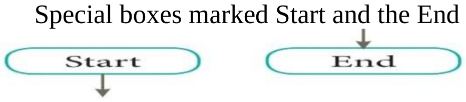
7. Parallelogram:

- Parallelogram boxes represent inputs given and outputs produced.



8. Special boxes:

- Special boxes marked Start and the End are used to indicate the start and the end of an execution.



9. Flowcharts also have disadvantages:

1. Flowcharts are less compact than representation of algorithms in programming language or pseudo code.
2. They obscure the basic hierarchical structure of the algorithms.
3. Alternative statements and loops are disciplined control flow structures.
   Flowcharts do not restrict us to disciplined control flow structures.

10. **Compound statements:**

- Statements may be composed of other statements, leading to hierarchical structure of algorithms.
- Statements composed of other statements are known as compound statements.

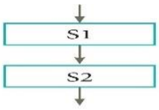
11. **There are three important control flow statements:** 1.Sequential 2.Alternative 3.Iterative

12. **Sequential statement:**

- A sequential statement is composed of a sequence of statements.
- The statements in the sequence are executed one after another, in the same order as they are written in the algorithm and the control flow is said to be sequential.
- Let S1 and S2 be statements.
- A sequential statement composed of S1 and S2 is written as

```
S1
S2
```

- In order to execute the sequential statement, first do S1 and then do S2.
- The arrow from S1 to S2 indicates that S1 is executed and after that S2 is executed.



- Let the input property be P and the input-output relation be Q for a problem.
- If statement S solves the problem, it is written as

```
1. - - P
2. S
3.- - Q
```

- If we decompose the problem into two components, we need to compose S as a sequence of two statements S1 and S2 such that the input-output relation of S1, say R is the input property of S2.

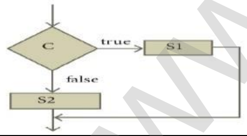
```
1.- - P
2. S1
3. - - R
4. S2
5. - - Q
```

13. **Alternative statement:**

- A condition is a phrase that describes a test of the state.
- If C is a condition and both S1 and S2 are statements, then

```
if   C
     S1
else
     S2
```

- is a statement, called an alternative statement, that describes the following action:
  1. Test whether C is true or false.
  2. If C is true, then do S1; otherwise do S2.
- In pseudo code, the two alternatives S1 and S2 are indicated by indenting them from the keywords if and else, respectively.
- Condition C has two outgoing arrows, labelled true and false.
- The true arrow points to the S1 box. The false arrow points to the S2 box.
- Out going arrows of S1 and S2 point to the same box, the box after the alternative statement.

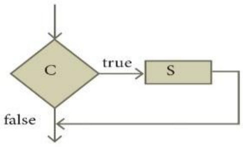


14. **Conditional statement:**

- Sometimes we need to execute a statement only if a condition is true and do nothing if the condition is false.
- This is equivalent to the alternative statement in which the else-clause is empty.
- This variant of alternative statement is called a conditional statement.
- If C is a condition and S is a statement, then

```
if   C
  S
```

- is a statement, called a conditional statement, that describes the following action:
  1. Test whether C is true or false.
  2. If C is true then do S; otherwise do nothing.



15. Case analysis:

- Alternative statement analyses the problem into two cases.
- Case analysis statement generalizes it to multiple cases.
- Case analysis splits the problem into an exhaustive set of disjoint cases. For each case, the problem is solved independently.
- 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
```

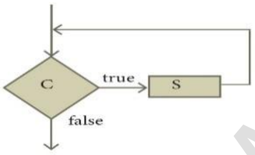
- The conditions C1, C2 and C3 are evaluated in turn.
- For the first condition that evaluates to true, the corresponding statement is executed, and the case analysis statement ends.
- If none of the conditions evaluates to true, then the default case S4 is executed.
- The cases are exhaustive: at least one of the cases is true.
- If all conditions are false, the default case is true.
- The cases are disjoint: only one of the cases is true.
- Though it is possible for more than one condition to be true, the case analysis always executes only one case, the first one that is true.
- If the three conditions are disjoint, then the four cases are (1) C1, (2) C2, (3) C3, (4) (not C1) and (not C2) and (not C3).

16. Iterative statement:

- An iterative process executes the same action repeatedly, subject to a condition C.
- If C is a condition and S is a statement, then

```
while  C
    S
```

- is a statement, called an iterative statement, that describes the following action:
  1. Test whether C is true or false.
  2. If C is true, then do S and go back to step 1; otherwise do nothing.
- The iterative statement is commonly known as a loop.
- These two steps, testing becomes false.
- When C becomes false, the loop ends and the control flows to the statement next to the iterative statement.
- The condition C and the statement S are called the loop condition and the loop body, respectively.
- Testing the loop condition and executing the loop body once is called an iteration. not C is known as the termination condition.
- Condition C has two outgoing arrows, true and false.
- The true arrow points to S box. If C is true, S box is executed and control flows back to C box.
- The false arrow points to the box after the iterative statement (dotted box). If C is false, the loop ends and the control flows to the next box after the loop.



17. In the Chameleons of Chromeland problem of Example 1.3, suppose two types of chameleons are equal in number. Construct an algorithm that arranges meetings between these two types so that they change their color to the third type. In the end, all should display the same color.

- Let us represent the number of chameleons of each type by variables a, b and c and their initial values by A, B and C, respectively.
- Let a = b be the input property.
- The input-output relation is a = b = 0 and c = A+B+C. Let us name the algorithm monochromatize.
- The algorithm can be specified as

```
Monochromatize (a, b, c)
-- inputs: a=A, b=B, c=C, a=b
-- outputs : a = b = 0 , c = A+B+C
```

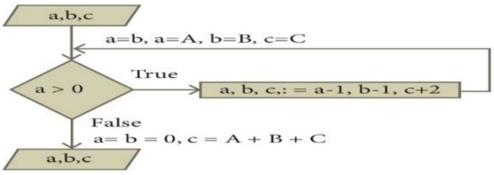
- In each iterative step, two chameleons of the two types (equal in number) meet and change their colors to the third one.
- For example, if A, B, C = 4, 4, 6, then the series of meetings will result in

iteration	a	b	c
0	4	4	6
1	3	3	8
2	2	2	10
3	1	1	12
4	0	0	14

- In each meeting, a and b each decreases by 1, and c increases by 2.
- The solution can be expressed as an iterative algorithm.

```
monochromatize(a, b, c)
    -- inputs: a=A, b=B, c=C, a=b
    -- outputs: a = b = 0, c = A+B+C
        while a > 0
            a, b, c := a-1, b-1, c+2
```

- The algorithm is depicted in the flowchart of,



18. Refinement:

- In refinement, starting from high level, each statement is repeatedly expanded into more detailed statements in the subsequent levels.
- After decomposing a problem into smaller sub problems, the next step is either to refine the sub problem or to abstract the sub problem.

1. Each sub problem can be expanded into more detailed steps.
   Each step can be further expanded to still finer steps and so on. This is known as refinement.
2. We can also abstract the sub problem.
   We specify each sub problem by its input property and the input-output relation.
   While solving the main problem, we only need to know the specification of the sub problems.
   We do not need to know how the sub problems are solved.

19. Functions:

- After an algorithmic problem is decomposed into sub problems, we can abstract the sub problems as functions.
- A function is like a sub-algorithm. Similar to an algorithm, a function is specified by the input property and the desired input-output relation.

CHAPTER – 8 ITERATION AND RECURSION

1. Suppose the following assignment is executed with (u, v) = (20,15). We can annotate before and after the assignment. -- before: u, v = 20, 15 u, v :=u+5,v-5 -- after: u, v = 25, 10
After assignment (u, v) = (25, 10). But what do you observe about the value of the function u + v?

Answer:

before: u + v = 20 + 15 = 35
after: u + v = 25 + 10 = 35

- The assignment has not changed the value of u + v.
- We say that u + v is an invariant of the assignment.
- We can annotate before and after the assignment with the invariant expression.

-- before: u + v = 35
u, v : = u + 5, v - 5
-- after : u + v = 35

- We can say, u + v is an invariant: it is 35 before and after.
- Or we can say u + v =35 is an invariant: it is true before and after.

2. If we execute the following assignment with (p, c = 10, 9), after the assignment, (p, c) = (11, 10).
-- before : p, c = 10 , 9 p, c := p + 1, c+1 -- after: p, c = 11 , 10
Can you discover an invariant? What is the value of p - c before and after?

Answer:

before: p — c = 10 — 9 = 1
after: p — c = 11 — 10 = 1
We find that p - c = 1 is an invariant.

3. Consider two variables m and n under the assignment m, n := m + 3, n – 1 Is the expression m + 3n an invariant?

Answer:

Let P(m, n) = m + 3n. Then
P(m, n) [m, n := m + 3, n — l]
= m + 3n [m, n := m + 3, n — l]
= (m + 3) + 3(n — l)
= m + 3 + 3n — 3
= m + 3n
= P(m, n)

- Since (m + 3n) [m, n : = m + 3, n - 1] = m + 3n, m + 3n is an invariant of the assignment m, n := m + 3, n - l.

4. There are 6 equally spaced trees and 6 sparrows sitting on these trees,one sparrow on each tree. If a sparrow flies from one tree to another, then at the same time, another sparrow flies from its tree to some other tree the same distance away, but in the opposite direction. Is it possible for all the sparrows to gather on one tree?

- Let us index the trees from 1 to 6. The index of a sparrow is the index of the tree it is currently sitting on.
- A pair of sparrows flying can be modeled as an iterative step of a loop.
- When a sparrow at tree i flies to tree i + d, another sparrow at tree j flies to tree j — d.
- Thus, after each iterative step, the sum S of the indices of the sparrows remains invariant.
- Moreover, a loop invariant is true at the start and at the end of the loop.
- At the start of the loop, the value of the invariant is **S = 1 + 2 + 3 + 4 + 5 + 6 = 21**
- When the loop ends, the loop invariant has the same value.
- However, when the loop ends, if all the sparrows were on the same tree, say k, then S = 6k.

S = 21,	loop invariant at the start of the loop
S = 6k,	loop invariant at end of the loop
6k= 21	loop invariant has the same value at the start and the end

- 21 is a multiple of 6
- It is not possible — 21 is not a multiple of 6.
- The desired final values of the sparrow indices is not possible with the loop invariant.
- Therefore, all the sparrows cannot gather on one tree.

5. Consider the Chameleons of Chromeland of Example 6.3. There are 13 red, 15 green and 17 blue chameleons on Chromeland. When two chameleons of different colors meet they both change their color to the third one (for example, if a red and a green meet, both become blue). Is it possible to arrange meetings that result in all chameleons displaying blue color?

- Let r, g and b be the numbers of red, green and blue chameleons.
- We can model the meetings of two types as an iterative process.
- A meeting changes (r, g, b) into (r-1, g-1, b+2) or (r-1, g+2, b-1) or (r+2, g-1, b-1).
- Consider, for example, the meeting of a red and a green chameleon.
  r, g, b := r-1, g-1, b+2
- The difference in the numbers of any two types either do not change or changes by 3. This is an invariant.
  r - 1 - (g - 1) = r - g
  r - 1 - (b + 2) = (r - b) - 3
  g - 1 - (b + 2) = (g - b) - 3
- This is true for all three cases.
- If any two types differ in number by a multiple of 3 at the start of the iterative process, the difference can be reduced in steps of 3 to 0, when the iterative process ends. However, at the start,
  r - g = 13 - 15 = -2
  g - b = 15 - 17 = -2
  b - r = 17 - 13 = 4
- No two colors differ in number by a multiple of 3.
- Therefore, all the chameleons cannot be changed to a single color.

CHAPTER – 9 (PART – 1) INTRODUCTION TO C++

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

- Literals are data items whose values do not change during the execution of a program.
- Therefore Literals are called as Constants.
- Three types of integer 1.Decimal 2.Octal 3.Hexa decimal

2. Which character constant in C++?

- A character constant in C++ is any valid single character enclosed within single quotes.
  Valid character constants : 'A', '2', '$'   Invalid character constants : "A"

3. How are non-graphic characters represented in C++?

- Non-printable characters can be represented by using escape sequences.
- An escape sequence is represented by a backslash followed by one or two characters.

4. What is non-graphic characters?

- C++ allows certain non-printable characters represented as character constants.
- Non-printable characters are also called as non-graphic characters.

<u>**Ex:**</u> Backspace, tabs

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

- Sequence of characters enclosed within double quotes are called as String literals.
- By default, string literals are automatically added with a special character **'\0' (Null)** at the end.
- Therefore, the string "welcome" will actually be represented as "welcome\0" in memory and the size of this string is not 7 but 8 characters i.e., inclusive of the last character \0.
  Valid string Literals : "A", "Welcome" "1234"   Invalid String Literals : 'Welcome', '1234'

6. What is the use of operators?

- Operators are used to perform calculations on an operands that yield a new value.

7. What are binary operators? Give examples of arithmetic binary operators.

- Binary operators are the operators that required two operands.

Ex: y=a+b-c

8. What does the modulus operator % do?

- Modulus operator (%) is used to get the remainder of two integer division.

Ex: 10%3=1

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

- Errors occurs because modulus operator % cannot be used on floating point data.

10. History of C++

- C++ was developed by Bjarne Stroustrup at AT & T Bell Laboratory during 1979.
- C++ is originally derived from C language and influenced by many languages like Simula, BCPL, Ada, ML, CLU and ALGOL 68.
- Till 1983, it was referred “New C” and “C with Classes”. In 1983, the name was changed as C++ by Rick Mascitti.

11. Benefits of learning C++

- C++ is a highly portable language and is often the language of choice for multi-device, multi-platform app development.
- C++ is an object-oriented programming language and includes **classes**, **inheritance**, **polymorphism**, **data abstraction** and **encapsulation**.
- C++ has a rich function library.
- C++ allows exception handling, inheritance and function overloading which are not possible in C.
- C++ is a powerful, efficient and fast language.
- It finds a wide range of applications – from GUI applications to 3D graphics for games to real-time mathematical simulations.

12. Why C++ called hybrid language?

- C++ is one of the most popular programming language which supports both procedural and Object Oriented Programming paradigms.
- Thus, C++ is called as a **hybrid language.**

13. Character set:

- Character set is a set of characters which are used to write a C++ program.
- A character represents any alphabet, number or any other symbol (special characters) mostly available in the keyboard.

C++ accepts the following characters.

Alphabets	A …. Z, a ….. z
Numeric	0 …. 9
Special Characters	+ - * / ~ ! @ # $ % ^& [ ] ( ) { } = >< _ \ | ? . , : ‘ “ ;
White space	Blank space, Horizontal tab (→), Carriage return (), Newline, Form feed
Other characters	C++ can process any of the 256 ASCII characters as data.

14. Identifiers:

- Identifiers are the user-defined names given to different parts of the C++ program viz. variables, functions, arrays, classes etc.,
- These are the fundamental building blocks of a program. Every language has specific rules for naming the identifiers.

15. Rules for naming an identifier:

- The first character of an identifier must be an alphabet or an underscore (_).
- Only alphabets, digits and underscore are permitted. Other special characters are not allowed as part of an identifier.
- C++ is case sensitive as it treats upper and lower-case characters differently.
- Reserved words or keywords cannot be used as an identifier name.

Identifiers	**Valid / Invalid**	**Reason for invalid**
Num	Valid	-
NUM	Valid	-
_add	Valid	-
total_sales	Valid	-
tamilMark	Valid	-
num-add	Invalid	Contains special character (-)

16. Operators & operands:

- The symbols which are used to do some mathematical or logical operations are called as **“Operators”.**
- The data items or values that the oper ators act upon are called as **“Operands”.**

17. Operators classified:

1. Unary Operators - Require only one operand

2. Binary Operators - Require two operands, 3. **Ternary Operators** - Require three operands

18. What is association?

- The operands and the operators are grouped in a specific logical way for evaluation.
- This logical grouping is called as an Association.

19. What are called separators or punctuators?

- Punctuators are symbols, which are used as delimiters, while constructing a C++ program.
- They are also called as **“Separators”.**

20. What is “Stream extraction” or “get from” operator?

- C++ provides the operator >> to get input.
- It extracts the value through the keyboard and assigns it to the variable on its right; hence, it is called as **“Stream extraction”** or **“get from”** operator.

21. What is Stream insertion” or “put to” operator?

- C++ provides << operator to perform output operation.
- The operator << is called the **“Stream insertion”** or **“put to”** operator.
- It is used to send the strings or values of the variables on its right to the object on its left. << is a binary operator.

22. What is cascading of I/O operators?

- The multiple use of input and output operators such as >> and << in a single statement is known as cascading of I/O operators.

23. Execution of C++ program:

1.Creating Source code:

- Creating includes typing and editing the valid C++ code as per the rules followed by the C++ Compiler.

2.Saving source code with extension .cpp

- After typing, the source code should be saved with the extension .cpp

3.Compilation:

- This is an important step in constructing a program.
- In compilation, compiler links the library files with the source code and verifies each and every line of code.
- If any mistake or error is found, it will throw error message.
- If there are no errors, it translates the source code into machine readable object file with an extension .obj

4.Execution:

- This is the final step of a C++ Program.
- In this stage, the object file becomes an executable file with extension .exe.
- Once the program becomes an executable file, the program has an independent existence.

24. Working with Dev C++:

- Dev C++ is an open source, cross platform (alpha version available for Linux), full featured Integrated
- Development Environment (IDE) distributed with the GNU General Public License for programming in C and C++.
- It is written in Delphi. It can be downloaded from **http://www.bloodshed.net/dev/devcpp.html**

1. After installation **Dev C++** icon is available on the desktop. Double click to open IDE.
2. To create a source file, Select **File → New → Source file** or **Press Ctrl + N**.
3. In the screen that appears, type your C++ program and save the file by clicking **File → Save** or Pressing **Ctrl + S.**
   It will add .cpp by default at the end of your source code file.
   No need to type .cpp along with your file name.
4. After save, Click Execute → Compile and Run or press F11 key.
5. After successful compilation, output will appear in output console.

25. Input operator with example.

Input operator:

- C++ provides the operator >> to get input. It extracts the value through the keyboard and assigns it to the variable on its right; hence, it is called as “Stream extraction” or “get from” operator.
- It is a binary operator i.e., it requires two operands.
- The first operand is the pre-defined identifier cin (pronounced as C-In) that identifies keyboard as the input device.
- The second operand must be a variable.
- To receive or extract more than one value at a time, >> operator should be used for each variable.
- This is called cascading of operator.

Example:

cin >> num;	Pre-defined object cin extracts a value typed on keyboard and stores it in variable num.
cin >>x >> y;	This is used to extract two values. cin reads the first value and immediately assigns that to variable x; next, it reads the second value which is typed after a space and assigns that to y. Space is used as a separator for each input

26. Output operator with example.

Output Operator:

- C++ provides << operator to perform output operation.
- The operator << is called the “Stream insertion” or “put to” operator.
- It is used to send the strings or values of the variables on its right to the object on its left. << is a binary operator.
- The first operand is the pre-defined identifier cout (pronounced as C-Out) that identifies monitor as the standard output object.
- The second operand may be a constant, variable or an expression.
- To send more than one value at a time, << operator should be used for each constant/variable/expression. This is called cascading of operator.

Example:

cout << "Welcome";	Pre-defined object cout sends the given string "Welcome" to screen.
cout << "The sum = " << sum;	First, cout sends the string "The Sum = " to the screen and then sends the value of the variable sum; Usually, cout sends everything specified within double quotes or single quotes i.e., string or character constants, except non-graphic characters.
cout <<"\n The Area: " <<3.14*r*r;	First, cout sends everything specified within double quotes except \n to the screen, and then it evaluates the expression 3.14*r*r and sends the result to the screen. \n – is a non graphic character constant to feed a new line.
cout << a + b ;	cout sends the sum of a and b to the output console (monitor)

CHAPTER – 9 (PART – 2) DATA TYPES, VARIABLES AND EXPRESSIONS

1. What do you mean by fundamental data types?

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

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

- Since all are characters are represented in memory by their associated ASCII codes.

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

1.They can represent values between the integers. 2.They can represent a much greater range of values.

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

- In double data type more fractions can be accommodated in double than in float type.

5. What is the use of void data type?

- Void data type is used as a return type for functions that do not return any value.

6. What are modifiers or qualifiers? What is the use of modifiers?

- Modifiers can be used to modify (expand or reduce) the memory allocation of any fundamental data type.
- They are also called as Qualifiers.
- There are four modifiers used in C++. They are: (1) signed (2) unsigned (3) long (4) short

7. What is wrong with the following C++ statement: long float x;

- Instead of long float x use double x;

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

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

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

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

For example, int num1, num2, sum;
sum = num1 + num2;

- The above two statements can be combined into a single one as follows: **int sum = num1+num2;**
- This initializes sum using the known values of num1 and num2 during the execution.

10. What is wrong with the following statement? const int x;

- No value specified to the variable x correct statement; cons tint x=100;

11. What is meant by type conversion?

- The process of converting one fundamental data type into another is called as "Type Conversion".
- C++ provides two types of conversions. (1) Implicit type conversion (2) Explicit type conversion.

12. How implicit conversion is different from explicit conversion?

- Implicit type conversion is automatically done by computer
- Explicit type conversion is done by the programmer.

13. What is the difference between endl and \n?

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

14. What is the use of references?

1. References means addresses. 2. Address are used to locate the value in the memory.

15. What is the use of set precision ( )?

- Set precision ( ) is used to display numbers with fractions in specific number of digits.

16. C++, the data types are classified:

(1) Fundamental data types (2) User-defined data types and (3) Derived data types.

17. Int data type:

- Integer data type accepts and returns only integer numbers.
- If a variable is declared as an **int**,
- C++ compiler allows storing only integer values into it.

18. Char data type:

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

19. Float data type:

- If a variable is declared as float, all values will be stored as floating point values.

20. Double data type:

- This is for double precision floating point numbers.
- The double is also used for handling floating point numbers.

21. Void data type:

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

22. What are called junk or Garbage values?

- If you declare a variable without any initial value, the memory space allocated to that variable will be occupied with some unknown value.
- These unknown values are called as **“Junk”** or **“Garbage”** values.

23. What is “Initialization”?

- Assigning an initial value to a variable during its declaration is called as “Initialization”.

24. What is manipulators?

- Manipulators are used to format the output of any C++ program.
- Manipulators are functions specifically designed to use with the insertion (<<) and extraction(>>) operators.

25. Setw ( )

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

26. What is expression?

- An expression is a combination of operators, constants and variables arranged as per the rules of C++.
- It may also include function calls which return values.
- An expression may consist of one or more operands, and zero or more operators to produce a value.

27. What are the types of expression?

(i) Constant Expression (ii) Integer Expression (iii) Floating Expression (iv) Relational Expression
(v) Logical Expression (vi) Bitwise Expression (vii) Pointer Expression

28. Explain expression with types.

- An expression is a combination of operators, constants and variables arranged as per the rules of C++.
- It may also include function calls which return values.
- An expression may consist of one or more operands, and zero or more operators to produce a value.

SN	Expression	Description	Example
1	Constant Ex	Constant expression consist only constant values	int num=100;

2	Integer Expression	The combination of integer and character values and/or variables with simple arithmetic operators to produce integer results.	sum=num1+num2;
			avg=sum/5;

3	Float Expression	The combination of floating point values and/or variables with simple arithmetic operators to produce floating point results.	Area=3.14*r*r;

4	Relational Expression	The combination of values and/or variables with relational operators to produce bool(true means 1 or false means 0) values as results.	x>y;
			a+b==c+d;

5	Logical Expression	The combination of values and/or variables with Logical operators to produce bool values as results.	(a>b)&& (c==10);
6	Bitwise Exp	The combination of values and/or variables with Bitwise operators.	x>>3; a<<2;
7	Pointer Expression	A Pointer is a variable that holds a memory address. Pointer variables are declared using (✳) symbol.	int *ptr;

29. Type Conversion with types.

- The process of converting one fundamental data type into another is called as “Type Conversion”.
- C++ provides two types of conversions. (1) Implicit type conversion (2) Explicit type conversion.

1.Implicit type conversion:

- An Implicit type conversion is a conversion performed by the compiler automatically.
- So, implicit conversion is also called as **“Automatic conversion”.**
- This type of conversion is applied usually whenever different data types are intermixed in an expression.
- If the type of the operands differ, the compiler converts one of them to match with the other, using the rule that the “smaller” type is converted to the “wider” type, which is called as **“Type Promotion”.**

For example:

```
#include <iostream>
using namespace std;
int main()
{
int a=6;
float b=3.14;
cout << a+b;
}
```

- In the above program, operand **a** is an int type and **b** is a float type.
- During the execution of the program, int is converted into a float, because a float is wider than int.

2.Explicit type conversion:

- C++ allows explicit conversion of variables or expressions from one data type to another specific data type by the programmer. It is called as **"type casting".**

Syntax:

(type-name) expression; Where type-name is a valid C++ data type to which the conversion is to be performed.

Example:

```
#include <iostream>
using namespace std;
int main( )
{
float varf=78.685;
cout << (int) varf;
}
```

- In the above program, variable **varf is** declared as a **float** with an initial value 78.685.
- The value of **varf** is explicitly converted to an **int** type in cout statement.
- Thus, the final output will be 78.

CHAPTER – 10 FLOW OF CONTROL

1. Define control flow:

- The flow of control jumps from one part of the code to another segment of code.
- Program statements that cause such jumps are called as "Control flow".

2. Write the basic control structures.

- The basics of control structures such as "Selection", "Iteration" and "Jump" statement.

3. Define statements:

- A computer program is a set of statements or instructions to perform a specific task.
- These statements are intended to perform specific action.
- The action may be of variable declarations, expression evaluations, assignment operations, decision making, looping and so on.

4. What are the types of statements?

- There are two kinds of statements used in C++. (i) Null statement (ii) Compound statement

5. Null statement:

- The "null or empty statement" is a statement containing only a semicolon.
- It takes the flowing form: ; // it is a null statement

6. Compound statement with general format:

- C++ allows a group of statements enclosed by pair of braces {}.
- This group of statements is called as a compound statement or a block.

The general format of compound statement is:

```
{
statement1;
statement2;
statement3;
}
```

7. Looping 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.

8. Exit condition or test condition:

- The set of statements that are executed again and again is called the body of the loop.
- The condition on which the execution or exit from the loop is called exit-condition or test-condition.

9. If statement:

- The if statement evaluates a condition, if the condition is true then a true-block(a statement or set of statements) is executed, otherwise the true-block is skipped

10.	**If-else statement:** ▪ In the above examples of if, you have seen that, a block of statements are executed only if the condition evaluates to true. ▪ What if there is another course of action to be followed if the condition evaluates to false. ▪ There is another form of if that allows for this kind of either or condition by providing an else clause.
11.	**Nested if:** ▪ An if statement which contains another if statement is called nested if. The nested can have one of the following three forms. 1. If nested inside if part 2. If nested inside else part 3. If nested inside both if part and else part
12.	**If -else-if ladder:** ▪ The if-else ladder is a multi-path decision making statement. ▪ In this type of statement 'if' is followed by one or more else if statements and finally end with an else statement.
13.	**The ?: Alternative to if- else :** ▪ The conditional operator (or Ternary operator) is an alternative for 'if else statement'. ▪ The conditional operator that consists of two symbols (?:). It takes three arguments
14.	**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.
15.	**Rules for switch statement:** 1. The expression provided in the switch should result in a constant value otherwise it would not be valid. 2. Duplicate case values are not allowed. 3. The default statement is optional. 4. The break statement is used inside the switch to terminate a statement sequence. When a break statement is reached, the switch terminates, and the flow of control jumps to the next line following the switch statement. 5. The break statement is optional. If omitted, execution will continue on into the next case. The flow of control will fall through to subsequent cases until a break is reached. 6. Nesting of switch statements is also allowed.
16.	**Switch vs if-else:** ▪ "if-else" and "switch" both are selection statements. ▪ The selection statements, transfer the flow of the program to the particular block of statements based upon whether the condition is "true" or "false".
17.	**C++ supports three types of iteration statements:** 1.for statement 2.while statement 3.do-while statement
18.	**Parts of a loop:** ▪ Every loop has four elements that are used for different purposes. ▪ These elements are Initialization expression, Test expression, Update expression, The body of the loop
19.	**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)) separated by semicolons.
20.	**Empty loop:** ▪ Empty loop means a loop that has no statement in its body is called an empty loop.
21.	**While loop:** ▪ A while loop is a control flow statement that allows the loop statements to be executed as long as the condition is true. ▪ The while loop is an entry-controlled loop because the test-expression is evaluated before entering into a loop.
22.	**Do-while loop**: ▪ The do-while loop is an exit-controlled loop. ▪ In do-while loop, the condition is evaluated at the bottom of the loop after executing the body of the loop. ▪ This means that the body of the loop is executed at least once, even when the condition evaluates false during the first iteration
23.	**Jump statements:** ▪ Jump statements are used to interrupt the normal flow of program. ▪ Types of Jump Statements are, goto statement, break statement, continue statement
24.	**Goto statement:** ▪ The goto statement is a control statement which is used to transfer the control from one place to another place without any condition in a program.
25.	**Break statement:** ▪ A break statement is a jump statement which terminates the execution of loop and the control is transferred to resume normal execution after the body of the loop

26. Continue statement:

- The continue statement works quite similar to the break statement.
- Instead of terminating the loop (break statement), continue statement forces the loop to continue or execute the next iteration.
- When the continue statement is executed in the loop, the code inside the loop following the continue statement will be skipped and next iteration of the loop will begin.

27. Difference between Break and Continue

Break	Continue
Break is used to terminate the execution of the loop.	Continue is not used to terminate the execution of loop.
It breaks the iteration.	It skips the iteration.
When this statement is executed, control will come out from the loop and executes the statement immediate after loop.	When this statement is executed, it will not come out of the loop but moves/jumps to the next iteration of loop.
Break is used with loops as well as switch case.	Continue is only used in loops, it is not used in switch case.

28. Key Differences Between if-else and switch

S	if-else	Switch
1	Expression inside if statement decide whether to execute the if block or under else block.	expression inside switch statement decide which case to execute.
2	An if-else statement uses multiple statements for multiple choices	switch statement uses single expression for multiple choices.
3	If-else statement checks for equality as well as for logical expression.	switch checks only for equality.
4	The if statement evaluates integer, character, pointer or floating-point type or Boolean type.	switch statement evaluates only character or a integer data type.
5	If the condition is false the else block statements will be executed	If the condition is false then the default statements are executed

29. What will be output for the following program?

Output: 10 9 8 7 6 5 4 3 2 1

```
#include<iostream>
using namespace std;
int main()
{
int n=10;
do
{
        cout<<n<<",";
        n --;
}
while (n>0);
}
```

CHAPTER – 11 FUNCTIONS

1. Need for Functions:

1. Divide and Conquer:

- Complicated programs can be divided into manageable sub programs called functions.
- A programmer can focus on developing, debugging and testing individual functions.
- Many programmers can work on different functions simultaneously.

2. Reusability:

- Few lines of code may be repeatedly used in different contexts.
- Duplication of the same code can be eliminated by using functions which improves the maintenance and reduce program size.
- Some functions can be called multiple times with different inputs.

2. Types of Functions:

1. Pre-defined or Built-in or Library Functions, 2. User-defined Function.

3. User-defined functions:

- C++ also provides the facility to create new functions for specific task as per user requirement.
- The name of the task and data required (arguments) are decided by the user and hence they are known as User-defined functions.

4. Standard input/output (stdio.h)

- This header file defines the standard I/O predefined functions getchar(), putchar(), gets(), puts() and etc.

5. Getchar() and putchar() functions:

- The predefined function getchar() is used to get a single character from keyboard and putchar() function is used to display it.

6. Gets() and puts() functions:

- Function gets() reads a string from standard input and stores it into the string pointed by the variable.
- Function puts() prints the string read by gets() function in a newline.

7.	**Isalnum()**
	▪ This function is used to check whether a character is alphanumeric or not.
	▪ This function returns non-zero value if c is a digit or a letter, else it returns 0.
	General Form: int isalnum (char c);

8.	**Isalpha()**
	▪ The isalpha() function is used to check whether the given character is an alphabet or not.
	General Form: isalpha(char c);

9.	**Isdigit()**
	▪ This function is used to check whether a given character is a digit or not.
	▪ This function will return 1 if the given character is a digit, and 0 otherwise.
	General Form: isdigit(char c);

10.	**Islower()** ▪ This function is used to check whether a character is in lower case (small letter) or not. ▪ This functions will return a non-zero value, if the given character is a lower case alphabet, and 0 otherwise. **General Form:** islower(char c)
11.	**Isupper()** ▪ This function is used to check the given character is uppercase. ▪ This function will return 1 if true otherwise 0. **General Form:** isupper(char c)

12.	**Toupper()**
	▪ This function is used to convert the given character into its uppercase.
	▪ This function will return the upper case.
	General Form: char toupper(char c);

13.	**Tolower()** ▪ This function is used to convert the given character into its lowercase. ▪ This function will return the lower case equivalent of the given character. ▪ If the given character itself is in lower case, the output will be the same. **General Form:** char tolower(char c)

14.	**Strcpy()**
	▪ The strcpy() function takes two arguments: target and source.
	▪ It copies the character string pointed by the source to the memory location pointed by the target.
	General Form: strcpy(Target String, Source String);

15.	**Strlen()**
	▪ The strlen() takes a null terminated string as its argument and returns its length.
	▪ The length does not include the null(\0) character.
	General Form: strlen(string);

16.	**Strcmp()**
	▪ The strcmp() function takes two arguments: string1 and string2.
	▪ It compares the contents of string1 and string2 lexicographically.
	General Form: strcpy(String1, String2);

17.	**Strcat()**
	▪ The strcat() function takes two arguments: target and source.
	▪ This function appends copy of the character string pointed by the source to the end of string pointed by the target.
	General Form: strcat(Target, source);

18.	**Strupr()**
	▪ The strupr() function is used to convert the given string into Uppercase letters.
	General Form: strcat(string);

19.	**Strlwr()**
	▪ The strlwr() function is used to convert the given string into Lowercase letters.
	General Form: strlwr(string);

20.	**Cos() function:** ▪ The cos() function takes a single argument in radians. ▪ The cos() function returns the value in the range of [-1, 1]. ▪ returned value is either in double, float, or long double.
21.	**Sqrt() function:** ▪ The sqrt() function returns the square root of the given value. ▪ The sqrt() function takes a single non-negative argument. ▪ If a negative value is passed as an argument to sqrt() function, a domain error occurs.
22.	**Sin() function:** ▪ The sin() function takes a single argument in radians. ▪ The sin() function returns the value in the range of [-1, 1]. The returned value is either in double, float, or long double.

23. Function Definition:

- In C++, a function must be defined before it is used anywhere in the program.

The general syntax of a function definition is:

```
Return_Data_Type Function_name(parameter list)
{
Body of the function
}
```

24. Formal Parameters and Actual Parameters or Arguments:

- Arguments or parameters are the means to pass values from the calling function to the called function.
- The variables used in the function definition as parameters are known as formal parameters.
- constants, variables or expressions used in the function call are known as actual parameters.

25. Default arguments:

- In C++, one can assign default values to the formal parameters of a function prototype.
- The Default arguments allows to omit some arguments when calling the function.

When calling a function,

- For any missing arguments, complier uses the values in default arguments for the called function.
- The default value is given in the form of variable initialization

26. Constant Arguments:

- The constant variable can be declared using const keyword.
- The const keyword makes variable value stable.
- The constant variable should be initialized while declaring.
- The const modifier enables to assign an initial value to a variable that cannot be changed later inside the body of the function.

Syntax: <returntype><functionname> (const <datatype variable=value>)

27. Call by value Method:

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

28. Call by reference or address Method:

- This method copies the address of the actual argument into the formal parameter.
- Since the address of the argument is passed, any change made in the formal parameter will be reflected back in the actual parameter.

29. The return statement:

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

Syntax: return expression/variable;

Example: return(a+b); return(a); return; // to terminate the function

30. Inline function:

- Normally the call statement to a function makes a compiler to jump to the functions (the definition of the functions are stored in STACKS) and also jump back to the instruction following the call statement.
- This reduces the speed of program execution. Inline functions can be used to reduce the overheads like STACKS for small function definition.
- An inline function looks like normal function in the source file but inserts the function's code directly into the calling program.
- To make a function inline, one has to insert the keyword inline in the function header.

Syntax: inline returntype functionname(datatype parameter 1, … datatype parameter n)

Advantages of inline functions:

- Inline functions execute faster but requires more memory space.
- Reduce the complexity of using STACKS.

31. Recursive Function:

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

32. Local Scope:

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

33. Function Scope:

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

- The life time of a function scope variable, is the life time of the function block.
- The scope of formal parameters is function scope.

34. File Scope or global 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.

35. 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.

36. Scope resolution operator:

- The scope operator reveals the hidden scope of a variable.
- The scope resolution operator (::) is used for the following purposes.
- To access a Global variable when there is a Local variable with same name.

CHAPTER – 12 ARRAYS AND STRUCTURES

1. Types of Arrays with one dimensional array:

- There are different types of arrays used in C++.
- They are: One-dimensional arrays, Two-dimensional arrays, Multi-dimensional arrays

One-dimensional array:

- This is the simplest form of an array.
- A one dimensional array represents values that are stored in a single row or in a single column.

Syntax: <data type><array_name> [<array_size>];

- data_type declares the basic type of the array, which is the type of each element in the array.
- array_name specifies the name with which the array will be referenced.
- array_size defines how many elements the array will hold. Size should be specified with square brackets [ ].

Example: int num[10];

- In the above declaration, an array named “num” is declared with 10 elements (memory space to store 10 different values) as integer type.

2. Explain two-dimensional array:

- Two-dimensional (2D) arrays are collection of similar elements where the elements are stored in certain number of rows and columns.
- An example m × n matrix where m denotes the number of rows and n denotes the number of columns.
  int arr[3][3];
- 2D array conceptual memory representation

Column subscript

arr[0] [0]	arr[0] [1]	arr[0] [3]
arr[1] [0]	arr[1] [1]	arr[1] [2]
arr[2] [0]	arr[2] [1]	arr[2] [2]

Declaration of 2-D array:

- The declaration of a 2-D array is: data-type array_name[row-size][col-size];
- In the above declaration, data-type refers to any valid C++ data-type, array_name refers to the name of the 2-D array, row-size refers to the number of rows and col-size refers to the number of columns in the 2-D array.

For example: int A[3][4];

- In the above example, A is a 2-D array, 3 denotes the number of rows and 4 denotes the number of columns.
- This array can hold a maximum of 12 elements.

3. Initialization of Two-Dimensional array:

- The array can be initialized in more than one way at the time of 2-D array declaration.

For example:

```
int matrix[4][3]=
{
{10,20,30},// Initializes row 0
{40,50,60},// Initializes row 1
{70,80,90},// Initializes row 2
{100,110,120}// Initializes row 3
};
int matrix[4][3]={10,20,30,40,50,60,70,80,90,100,110,120};
```

- Array’s row size is optional but column size is compulsory.

For example:

```
int matrix[][3]=
{
{10,20,30},// row 0
{40,50,60},// row 1
{70,80,90},// row 2
{100,110,120}// row 3
};
```

4. Initializing structure elements:

- Values can be assigned to structure elements similar to assigning values to variables.

Example:

```
balu.rollno= "702016";
balu.age= 18;
balu.weight= 48.5;
```

- Also, values can be assigned directly as similar to assigning values to Arrays.

```
balu={702016, 18, 48.5};
```

5. Structure Assignment:

- Structures can be assigned directly instead of assigning the values of elements individually.

Example:

- If Mahesh and Praveen are same age and same height and weight then the values of Mahesh can be copied to Praveen

```
struct Student
{
int age;
float height, weight;
}mahesh;
```

- The age of Mahesh is 17 and the height and weights are 164.5 and 52.5 respectively.

The following statement will perform the assignment.

```
    mahesh = {17, 164.5, 52.5};
    praveen =mahesh;
```

- will assign the same age, height and weight to Praveen.

6. Referencing Structure Elements:

- Once the two objects of student structure type are declared (balu and frank), their members can be accessed directly.
- 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
balu.weight
frank.rollno
frank.age
frank.weight
```

7. Types of 2-D array memory representation:

- There are two types of 2-D array memory representations. They are: Row-Major order, Column-Major order

8. Memory representation of 2-D array:

- Normally, the two-dimensional array can be viewed as a matrix.
- The conceptual view of a 2-D array is shown below: int A[4][3];

A[0][0]	A[0][1]	A[0][2]
A[1][0]	A[1][1]	A[1][2]
A[2][0]	A[2][1]	A[2][2]
A[3][0]	A[3][1]	A[3][2]

- In the above example, the 2-D array name A has 4 rows and 3 columns.
- Like one-dimensional, the 2-D array elements are stored in continuous memory.
- There are two types of 2-D array memory representations. They are: Row-Major order, Column-Major order

For example: int A[4][3]={ { 8,6,5}, { 2,1,9}, {3,6,4}, {4,3,2} }

Row Major order:

- In row-major order, all the elements are stored row by row in continuous memory locations, that is, all the elements in first row, then in the second row and so on.
- The memory representation of row major order is as shown below;

8	6	5	2	1	9	3	6	4	4	3	2
1000	1004	1008	**1012**	1016	1020	**1024**	1028	1032	**1036**	1040	1044
Row 0			**Row 1**			**Row 2**			**Row 3**		

Column Major order:

8	2	3	4	6	1	6	3	5	9	4	2
1000	1004	1008	1012	**1016**	1020	1024	1028	**1032**	1036	1040	1044
Col 0				**Col 1**				**Col 2**			

9. Explain Strings with array:

- 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 which must be appended at the end of the string.

Character Array (String) creation:

- To create any kind of array, the size (length) of the array must be known in advance, so that the memory locations can be allocated according to the size of the array.
- Once an array is created, its length is fixed and cannot be changed during run time.

Array Name : a
Array Length: n

Index:	0	1	2	3		[n-1]
	a[0]	a[1]	a[2]	a[3]		a[n-1]

First Element Last Element

Syntax:

- Array declaration is: char array_name[size];
- In the above declaration, the size of the array must be an unsigned integer value.

For example: char country[6];

- Here, the array reserves 6 bytes of memory for storing a sequence of characters.

Program:

```
#include <iostream>
using namespace std;
int main()
{
char country[6];
cout<< "Enter the name of the country: ";
cin>>country;
cout<<" The name of the country is "<<country;
}
```

Output:

```
Enter country the name: INDIA
The country name is INDIA
```

Initialization:

- The character array can be initialized at the time of its declaration.

The syntax is shown below: char array_name[size]={ list of characters separated by comma or a string } ;

For example: char country[6]="INDIA";

- In the above example, the text "INDIA" has 5 letters which is assigned as initial value to array country.
- The text is enclosed within double quotes.

CHAPTER – 13 OBJECT ORIENTED PROGRAMMING TECHNIQUES

1. 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 and Object Oriented Programming

2. Procedural programming:

- Procedural means a list of instructions were given to the computer to do something.
- Procedural programming aims more at procedures.
- This emphasis on doing things.

3. Important features of procedural programming:

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

4. Modular programming:

- Modular programming consist of a list of instructions that instructs the computer to do something.
- But this Paradigm consists of multiple modules, each module has a set of functions of related types.
- Data is hidden under the modules.
- Arrangement of data can be changed only by modifying the module

5. Important features of Modular programming:

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

6. Object Oriented Programming:

- Object Oriented Programming paradigm emphasizes on the data rather than the algorithm.
- It implements programs using classes and objects.

7. Important features of Object oriented programming:

- Emphasizes on data rather than algorithm
- Data abstraction is introduced in addition to procedural abstraction
- Data and its associated operations are grouped in to single unit
- Programs are designed around the data being operated
- Relationships can be created between similar, yet distinct data types
- Example: C++, Java, VB.Net, Python etc.

8. Class:

- A Class is a construct in C++ which is used to bind data and its associated function together into a single unit using the encapsulation concept.
- Class is a user defined data type.
- Class represents a group of similar objects.
- It can also be defined as a template or blueprint representing a group objects that share common properties and relationship.

9. Objects:

- Objects represents data and its associated function together into a single unit.
- Objects are the basic unit of OOP.
- Basically an object is created from a class.
- They are instances of class also called as class variables
- An identifiable entity with some characteristics and behaviour is called object.

10. Object-Oriented Programming approach mainly encourages:

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

11. Main Features of Object Oriented Programming:

1. Data Abstraction, 2.Encapsulation, 3.Modularity, 4.Inheritance, 5.Polymorphism

12. Encapsulation:

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

13. Data binding:

- Encapsulation is about binding the data variables and functions together in class.
- It can also be called data binding.

14. Data or information hiding:

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

15. Data Abstraction:

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

16. Methods or member function:

- They encapsulate all the essential properties of the object that are to be created.
- The attributes are called data members because they hold information.
- The functions that operate on these data are called methods or member function.

17. 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.

18. Inheritance:

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

19. Polymorphism:

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

20. 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.

CHAPTER – 14 CLASSES AND OBJECTS

1. What are the features of OOP languages?

- Four features commonly present in OOP languages:
- Abstraction, Encapsulation, Inheritance and Polymorphism.

2. Need for Class:

- Class is a way to bind the data and its associated functions together.
- Classes are needed to represent real world entities that not only have data type properties but also have

associated operations.
- It is used to create user defined data type

3. General Form of a class definition:

```
class class_name
{
private:
variable declaration;
function declaration;
protected:
variable declaration;
function declaration;
public:
variable declaration;
function declaration;
};
```

4. Class Access Specifiers:

- Data hiding is one of the important features of Object Oriented Programming which allows preventing the functions of a program to access directly the internal representation of a class type.
- The access restriction to the class members is specified by public, private and protected sections within the class body.
- The keywords public, private and protected are called access specifiers.
- The default access specifier for members is private.

5. Public / Private / Protected Members:

Public Members:
- A public member is accessible from anywhere outside the class but within a program.
- You can set and get the value of public data members even without using any member function.

The Private Members:
- A private member cannot be accessed from outside the class.
- Only the class member functions can access private members.
- By default all the members of a class would be private.

The Protected Members:
- A protected member is very similar to a private member but it provides one additional benefit that they can be accessed in child classes which are called derived classes (inherited classes).

6. Defining methods of a class:

- Without defining the methods (functions), class definition will become incomplete.
- The member functions of a class can be defined in two ways. 1.Inside the class definition 2.Outside

7. Inside / Outside the class definition:

1.Inside the class definition:
- When a member function is defined inside a class, it behaves like inline functions.
- These are called Inline member functions.

2.Outside the class definition:
- When Member function defined outside the class just like normal function definition (Function definitions you are familiar with) then it is be called as outline member function or non-inline member function.
- Scope resolution operator (::) is used for this purpose

8. Syntax for defining the outline member function:

```
return_type class_name :: function_name (parameter list)
{
function definition
}
```

9. Creating Objects:

- 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.

For example: student s;
- In the above statement s is an instance of the class student.

10. Objects can be created in two methods:

1.Global object 2.Local object

11. Global / Local Object:

1.Global Object:
- If an object is declared outside all the function bodies or by placing their names immediately after the closing brace of the class declaration then it is called as Global object.
- These objects can be used by any function in the program

2.Local Object:

- If an object is declared with in a function then it is called local object.
- It cannot be accessed from outside the function.

12. **Referencing class members:**

- The members of a class are referenced (accessed) by using the object of the class followed by the dot (membership) operator and the name of the member.
- The general syntax for calling the member function is: Object_name . function_name(actual parameter);

13. **Constructors:**

- The definition of a class only creates a new user defined data type.
- The instances of the class type should be instantiated (created and initialized) .
- Instantiating object is done using constructor

14. **Need for Constructors:**

- An array or a structure in c++ can be initialized during the time of their declaration.

15. **Functions of constructor:**

1.To allocate memory space to the object and 2.To initialize the data member of the class object

16. **Types of constructors:**

- There are different types of constructors.

1.Default Constructors:

- A constructor that accepts no parameter is called default constructor.
- For example in the class Data, Data ::Data() is the default constructor .
- Using this constructor Objects are created similar to the way the variables of other data types are created.
- If a class does not contain an explicit constructor (user defined constructor) the compiler automatically generate a default constructor.

2.Parameterized Constructors:

- A constructor which can take arguments is called parameterized constructor.
- This type of constructor helps to create objects with different initial values.
- This is achieved by passing parameters to the function.

Example: Data :: Data(int,int);

3.Copy Constructors:

- A constructor having a reference to an already existing object of its own class is called copy constructor.
- It is usually of the form Data (Data&), where Data is the class name.

A copy constructor can be called in many ways:

1) When an object is passed as a parameter to any of the member functions

Example: void Data::putdata(Data x);

2) When a member function returns an object

Example: Data getdata() { }

3) When an object is passed by reference to an instance of its own class

Example: Data d1, d2 (d1); // d2(d1) calls copy constructor

17. **Invocation of constructors:**

- There are two ways to create an object using parameterized constructor. 1.Implicit call 2.Explicit call

1.Implicit call:

- In this method ,the parameterized constructor is invoked automatically whenever an object is created.
- For example simple s1(10,20); in this for creating the object s1 parameterized constructor is automatically invoked.

2.Explicit call:

- In this method ,the name of the constructor is explicitly given to invoke the parameterized constructor so that the object can be created and initialized .

Example: simple s1=simple(10,20); //explicit call

- Explicit call method is the most suitable method as it creates a temporary object the chance of data loss will not arise.
- A temporary object lives in memory as long as it is being used in an expression.
- After this it get destroyed.

18. **Dynamic initialization of Objects:**

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

19. **Characteristics of Constructors:**

- The name of the constructor must be same as that of the class
- No return type can be specified for constructor
- A constructor can have parameter list
- The constructor function can be overloaded
- They cannot be inherited but a derived class can call the base class constructor
- The compiler generates a constructor, in the absence of a user defined constructor.
- The constructor is executed automatically when the object is created
- A constructor can be used explicitly to create new object of its class type.

20. **Destructors:**
- When a class object goes out of scope, a special function called the destructor gets executed.
- The destructor has the same name as the class tag but prefixed with a ~(tilde).
- Destructor function also return nothing and it does not associated with any data type.

21. **Need of Destructors:**
- 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.

22. **Declaration and Definition:**
- A destructor is a special member function that is called when the lifetime of an object ends and destroys the object constructed by the constructor.
- Normally declared under public.

23. **Characteristics of Destructors:**
- The destructor has the same name as that class prefixed by the tilde character '~'.
- The destructor cannot have arguments
- It has no return type
- Destructors cannot be overloaded
- In the absence of user defined destructor, it is generated by the compiler
- The destructor is executed automatically when the control reaches the end of class scope to destroy the object
- They cannot be inherited

CHAPTER – 15 POLYMORPHISM

1. **Polymorphism:**
- The word polymorphism means many forms (poly – many, morph – shapes)
- Polymorphism is the ability of a message or function to be displayed in more than one form.

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

3. **Function's signature:**
- The number and types of a function's parameters are called the function's signature.

4. **Overload resolution:**
- The process of selecting the most appropriate overloaded function or operator is called overload resolution

5. **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.

6. **Operator overloading:**
- The term Operator overloading, refers to giving additional functionality to the normal C++ operators like +,++,-,—,+=,-=,*.<,>.
- It is also a type of polymorphism in which an operator is overloaded to give user defined meaning to it .
- For example '+' operator can be overloaded to perform addition on various data types, like for Integer, String(concatenation) etc.
- Almost all operators can be overloaded in C++.
- However there are few operator which can-not be overloaded.

Operator that are not overloaded are follows:

1.Scope operator (::) 2.Sizeof 3.Member selector (.) 4.Member pointer selector (✳) 5.Ternary operator (?:)

Operator Overloading Syntax

```
ReturnType classname :: Operator Operator Symbol (argument list)
{
\\ Function body
}
```

7. **Restrictions on Operator Overloading:**
- Precedence and Associativity of an operator cannot be changed.
- No new operators can be created, only existing operators can be overloaded.
- Cannot redefine the meaning of an operator's procedure.
- You cannot change how integers are added.
- Only additional functions can be 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

CHAPTER – 16 INHERITANCE

1. **Base class / Derived class:**
- In object-oriented programming, inheritance enables new class and its objects to take on the properties of the existing classes.
- A class that is used as the basis for creating a new class is called a superclass or base class.

2. **Advantage of inheritance:**
1.It represents real world relationships well 2.It provides reusability of code 3.It supports transitivity

3. **Derived Class and Base class**:

- While defining a derived class, the derived class should identify the class from which it is derived.

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.

```
class derived_class_name :visibility_mode base_class_name
{
  // members of derivedclass
};
```

4. **Visibility modes:**

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

5. **Private / Protected / Public visibility modes:**

1.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

2.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

3.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.

6. **Overriding / Shadowing Base class functions in derived class:**

- In case of inheritance there are situations where the member function of the base class and derived classes have the same name.
- If the derived class object calls the overloaded member function it leads to confusion to the compiler as to which function is to be invoked.
- The derived class member function have higher priority than the base class member function.
- This shadows the member function of the base class which has the same name like the member function of the derived class.
- The scope resolution (::) operator resolves this problem.

CHAPTER – 17 COMPUTER ETHICS AND CYBER SECURITY

1. **What is cyber crime?**

- Cybercrime is an intellectual, white-collar crime.
- Those who commit such crimes generally manipulate the computer system in an intelligent manner.
- For example – Illegal money transfer via internet.

2. **Write short note about Virus.**

❖ A virus is a small piece of computer code that can repeat itself and spreads from one computer to another by attaching itself to another computer file.

❖ One of the most common virus is **Trojan**.

3. **Define Cyber-crime:**

- A cyber-crime is a crime which involves computer and network.
- This is becoming a growing threat to society and is caused by criminals or irresponsible action of individuals who are exploiting the widespread use of Internet.

4. **What is ethics?**

- Ethics is a set of moral principles that govern the behaviour of an individual in a society, and Computer ethics is set of moral principles that regulate the use of computers by users.

5. **Define Ethics:**

- Ethics means "What is wrong and What is Right".
- It is a set of moral principles that rule the behaviour of individuals who use computers.
- An individual gains knowledge to follow the right behaviour, using morals that are also known as ethics.

6. **Computer ethics:**
   - Computer ethics deals with the procedures, values and practices that govern the process of consuming computer technology and its related disciplines without damaging or violating the moral values and beliefs of any individual, organization or entity.

7. **Software piracy:**
   - Software Piracy is about the copyright violation of software created originally by an individual or an institution.
   - It includes stealing of codes / programs and other information illegally and creating duplicate copies by unauthorized means and utilizing this data either for one's own benefit or for commercial profit.
   - In simple words, Software Piracy is "unauthorized copying of software".

8. **What is Shareware?**
   - An entirely different approach to software piracy is called Shareware,

9. **UNAUTHORIZED ACCESS:**
   - Unauthorized access is when someone gains access to a website, program, server, service, or other system by breaking into a legitimate user account.
   - To prevent unauthorized access, Firewalls, Intrusion Detection Systems (IDS), Virus and Content Scanners, Patches and Hot fixes are used.

10. **HACKING:**
    - Hacking is intruding into a computer system to steal personal data without the owner's permission or knowledge (like to steal a password).
    - It is also gaining unauthorized access to a computer system, and altering its contents.
    - It may be done in pursuit of a criminal activity or it may be a hobby

11. **CRACKING:**
    - Cracking is where someone edits a program source so that the code can be exploited or modified.
    - A cracker (also called a black hat or dark side hacker) is a malicious or criminal hacker.
    - "Cracking" means trying to get into computer systems in order to steal, corrupt, or illegitimately view data.

12. **Cracker:**
    - A cracker is someone who breaks into someone else's computer system, often on a network, bypassing passwords or licenses in computer programs.

13. **Phishing:**
    - Phishing is a type of computer crime used to attack, steal user data, including login name, password and credit card numbers.
    - It occurs when an attacker targets a victim into opening an e-mail or an instant text message

14. **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.
    - Pharming has been called "phishing without a trap"

15. **Man In The Middle (MITM)**
    - Man-in-the-middle attack (MITM; also Janus 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.
    - Example: Suppose Alice wishes to communicate with Bob. Meanwhile, Mallory wishes to intercept the conversation to overhear and optionally to deliver a false message to Bob.

16. **Web sites typically use cookies:**
    - To collect demographic information about who has visited the Web site.
    - Sites often use this information to track how often visitors come to the site and how long they remain on the site.
    - It helps to personalize the user's experience on the Web site.
    - Cookies can help store personal information about users so that when a user sub sequent returns to the site, a more personalized experience is provided.

17. **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.
    - In cryptography a key is a piece of information (parameter) that determines the functional output of a cryptographic algorithm.

18. **E-commerce:**
    - E-Commerce is electronic data exchange or electronic filing of information.

19. **How to protect the information?**
    - Complex password setting can make your surfing secured.
    - When the internet is not in use, disconnect it.
    - Do NOT open spam mail or emails that have an unfamiliar sender.
    - When using anti-virus software, keep it up-to-date.

20. **Write two types of cyber attacks.**

Cyber Attack	Function
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.

CHAPTER – 18 TAMIL COMPUTING

1. **Search Engines in Tamil:**
- The "Search Engines" are used to search any information from the cyber space.
- Although there are many search engines, but only a few of them are frequently in use.
- In the top ten search engines, Google, Bing and Yahoo take first three places respectively.
- Google and Bing provide searching facilities in Tamil, which means you can search everything through Tamil.
- The Google search engine gives you an inbuilt Tamil virtual keyboard.

2. **E – Governance:**
- Getting Government services through internet is known as e-Governance.
- Govt. of Tamilnadu has been giving its services through Internet.
- One can communicate with Govt. of Tamilnadu from any corner of the World.
- One can get important announcements, government orders, and government welfare schemes from the web portal of Govt. of. Tamilnadu.

3. **E-Library:**
- E-Libraries are portal or website of collection of e-books.
- Tamil e-Library services provide thousands of Tamil Books as e-books mostly at free of cost.
- It is the most useful service to Tamil people who live far away from their home land.

4. **Familiar Tamil Keyboard Interface:**
- NHM Writer, E-Kalappai and Lippikar – are familiar Tamil keyboard interfaces software that is used for Tamil typing which works on Tamil Unicode, using phonetics.
- Sellinam and Ponmadal – are familiar Tamil keyboard layouts that works on Android operating system in Smart phone using phonetics.

5. **Famous Office automation software:**
- Microsoft Office, Open Office etc

6. **Tamil Translation Applications:**
- Thamizpori (தமிழ்பொறி) is a Tamil tranlation application having more than 30000 Tamil words equalent to English words.
- Using this application, we can translate small english sentences into Tamil.
- Google also gives an online translation facility, using this online facility we can translate from Tamil to any other language and vice versa.

7. **Tamil Programming Language:**
- Programming languages to develop software in computers and smart phones are available only in English.
- Now, efforts are taken to develop programming languages in Tamil.
- Based on Python programming language, the first Tamil programming language "Ezhil" (எழில்) is designed. With the help of this programming language, you can write simple programs in Tamil.

8. **ISCII (Indian Script Code for Information Interchange)**
- This is one of the encoding schemes specially designed for Indian languages including Tamil.
- It was unified with Unicode.

9. **Unicode:**
- Unicode is an encoding system, designed to handle various world languages, including Tamil.
- Its first version 1.0.0 was introduced in October 1991.
- When Unicode was introduced it could handle nearly 23 languages including Tamil.
- Among the various encoding scheme, Unicode is the best suitable to handle Tamil.

10. **Tamil Operating System:**
- An operating system is needed to access electronic systems such as computer and smart phone.
- Microsoft Windows is very popular operating system for personal computers.
- Linux is another popular open source operating system. Operating systems are used to access a computer easily.
- An operating system should be easy to work and its environment should be in an understandable form.
- Thus, all operating systems used in computers and smart phones are offered in Tamil environment.
- Windows Tamil Environment interface should be downloaded and installed from the internet.
- It displays all window elements such as Taskbar, desktop elements, names of icons, commands in Tamil.

11. **Tamil Wikipedia:**
- Wikipedia is a open source encyclopaedia where any person can write an article about any subject.
- There are more than One lakh articles in Tamil Wikipedia.
- Web Site: https://ta.wikipedia.org/
- In order to make Tamil as a living language, it is the duty of every Tamilian to actively use Tamil in the development of technology.

GLOSSARY

CHAPTER-1 INTRODUCTION TO COMPUTERS	
Computer	▪ It 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.
Vacuum tube	▪ Vacuum tubes contain electrodes for controlling electron flow and were used in early computers as a switch or an amplifier.
Transistors	▪ The transistor ("transfer resistance") is made up of semi-conductors. ▪ It is a component used to control the amount of current or voltage used for amplification/modulation of an electronic signal.
Punched cards	▪ Punch cards also known as Hollerith cards are paper cards containing several punched or perforated holes that were punched by hand or machine to represent data.
Machine Language	▪ Machine language is a collection of binary digits or bits that the computer reads and interprets.
Assembly language	▪ An assembly language is a low-level programming language.
Integrated Circuits	▪ The IC is a package containing many circuits, pathways, transistors, and other electronic components all working together to perform a particular function or a series of functions.
Microcomputer	▪ Micro computer is used to describe a standard personal computer.
High-level languages	▪ A high-level language is a computer programming language that isn't limited by the computer, designed for a specific job, and is easier to understand.
Natural Language Processing (NLP)	▪ Natural Language Processing is a method used in artificial intelligence to process and derive meaning from the human language.
Robotics	▪ Robot is a term coined by Karel Capek in the 1921 to play RUR (Rossum's Universal Robots). ▪ It is used to describe a computerized machine designed to respond to input received manually or from its surroundings.
Nanotechnology	▪ Nanotechnology is an engineering, science, and technology that develops machines or works with one atom or one molecule that is 100 Nano-meters or smaller.
Bioengineering	▪ A discipline that applies engineering principles of design and analysis to biological systems and biomedical technologies
CHAPTER-3 COMPUTER ORGANISATION	
Computer hardware	▪ The physical parts or components of a computer, such as the CPU, mother board, monitor, keyboard, etc.
Intel	▪ Intel Corporation is an American multinational corporation and technology company involving in hardware manufacturing, especially mother board and processors
Silicon chip	▪ Silicon chip is an integrated, set of electronic circuits on one small flat piece of semiconductor material, silicon.
Multipurpose	▪ Multipurpose is several purpose
Address bus	▪ Address bus is a collection of wires that carry the address as bits
Data bus	▪ Data bus is a collection of wires to carry data in bits
Control bus	▪ Control bus is a control line/collection of wires to control the operations/functions
Arithmetic	▪ Arithmetic operations are the mathematical operations on data like add, subtract etc
Data Transfer	▪ Data Transfer means moving data from one component to another
Logical operations	▪ Logical operations are the operations on binary/Boolean data like AND, OR , NOT
Bidirectional	▪ Bidirectional means both the directions/ways
Unidirectional	▪ Unidirectional means only one direction
Access time	▪ Access time is the time delay or latency between a request to an electronic system, and the access being completed or the requested data returned
CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM	
Operating System	▪ System software that enables the hardware to communicate and operate with other software.
Mouse	▪ Handheld hardware input device that control a cursor in a GUI and can move and select text, icons, files, and folders.
Windows	▪ Familiar operating system developed by Microsoft Corporation.
Desktop	▪ Opening screen of windows operating system.
Icon	▪ Tiny image represent a command.
Folder	▪ Container of files
Linux	▪ An operating system.
CHAPTER – 17 COMPUTER ETHICS AND CYBER SECURITY	
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.
Denial of service attack	▪ Overloading a system with fake requests so that it cannot serve normal legitimate requests.
Fraud	▪ Manipulating data, for example changing the banking records to transfer money to an unauthorized account.
Harvesting	▪ A person or program collects login and password information from a legitimate user to illegally gain access to others' account(s).
Identity theft	▪ It is a crime where the criminals impersonate individuals, usually for financial gain.
Intellectual property theft	▪ Stealing practical or conceptual information developed by another person or company.
Salami slicing	▪ Stealing tiny amounts of money from each transaction.
Scam	▪ Tricking people into believing something that is not true.
Spam	▪ Distribute unwanted e-mail to a large number of internet users.
Spoofing	▪ It is a malicious practice in which communication is send from unknown source disguised as a source known to the receiver.
CHAPTER 14 TO 17	
Paradigm	▪ Organizing principle of a program.
Abstraction	▪ Abstraction refers to showing only the essential features without revealing background details
Modularity	▪ Designing a system that is divided into a set of functional units (named modules) that can be composed into a larger application.
Base class	▪ A class whose properties are inherited by other newly created classes .Also called as parent class
Derived class	▪ A class which inherits the properties of the base class. Also called as child class or subclass.
Class	▪ Class represents a group of similar objects that share common properties
Object	▪ Identifiable entity with some characteristics and behaviour
Encapsulation	▪ Mechanism by which the data and function sare bound together into a single unit
Inheritance	▪ Process of creating new classes called derived classes, from the existing or base classes.
Signature	▪ Number of argument and type of argument
Polymorphism	▪ many forms
Default argument	▪ Initializing the argument with a value
Base Class:	▪ A class from which another class inherits (Also called Super class or parent class)
Derived Class:	▪ A class inheriting properties from another class. (Also called Sub class)
Inheritance	▪ The process of one class to inherit properties from another class
Inheritance Hierarchy	▪ The chain depicting relationship between a base class and the derived class (Also called Derivation Hierarchy)
Visibility mode	▪ The public, private or protected specifies that controls the visibility and availability of a member in a class
Vulnerability	▪ The possibility of being attacked or harmed.
Ethics	▪ Moral principles that govern a person's behaviour or the conducting of an activity.
Cyber	▪ Characteristic of the culture of computers, information technology, and virtual reality.
Computer Crime	▪ Computer crime is an intellectual crime to manipulate computer system.
Authenticity	▪ The quality of being real or true.
Sabotage	▪ Deliberately destroy, damage, or obstruct.
Perpetrator	▪ A person who carries out a harmful, illegal, or immoral act.
Software Piracy	▪ Software Piracy is the copyright violation of software created originally by one person and illegally used by someone else.
Hacking	▪ Hacking is gaining unauthorized access to computer system without the owner's permission.
Cracking	▪ Cracking is gaining unauthorized access to computer systems to commit a crime, such as stealing the code to make a copy-protected program run thus denying service to legitimate users.
Malicious	▪ Intentionally doing harm.
Freeware	▪ Freeware is a software available free of charge.
Shareware	▪ Shareware is a software that is distributed free of charge on a trial basis for a limited time.

PUBLIC COMPULSORY QUESTIONS WITH ANSWERS

TWO MARKS (PUBLIC QUESTIONS) (Q.NO 24)

1. Write a while loop that displays numbers 2, 4, 6, 8…....20. [J-2024]

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

2. Write the output of the following program. [M-2024]

```
#include<iostram>
using namespace std;
int main()
{
int i;
for(i=0;i<8;i++)
cout<<i<<endl;
return 0;
}
```

OUTPUT: 0 1 2 3 4 5 6 7 (Write vertical order)

3. Convert the following if-else statement into conditional statement (J-2023)

```
if (marks > = 60)
Grade = 'A';
else
Grade = 'B';
```

Answer: Grade = (marks > = 60)? A:B;

4. Write the output for the following: (M-2023)

```
#include<iostream>
using namespace std;
int main ()
{
  Double var1=87.25255;
  cout<<(float)var1<<end1;  cout<<(int)var1<<end1; }
```

Output

```
87.2525
87
```

5. What is an instruction set? (Aug-2022)

Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**.

6. What are importance of void data type? (M-2022)

1.To indicate the function does not return a value 2.To declare a generic pointer

7. for (int m=1;m<=9,M+=2) cout<<m; (S-2020)

1) How many times the loop will be executed? **8 times**

2) Write the output of the above snippet. **1 to 10**

8. If a = 65 , b= 15 then find (M-2020)

a=65, b=15

(i) a&b

8bits Binary value of 65 ➔ 0100 0001 8bits Binary value of 15 ➔ 0000 1111

8bits Binary value of a&b ➔ **0000 0001 ➔ 1_{10}**

(ii) a^b

8bits Binary value of 65 ➔ 0100 0001 8bits Binary value of 15 ➔ 0000 1111

8bits Binary value of a^b ➔ **0100 1110 ➔ 78_{10}**

9. Write down the importance of destructor. (J-2019)

- 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.

10. Write a while loop that displays numbers 5, 10, 15, ...50. (M-2019)

```
int i=5;
while (i<=50)
{
cout << i<<',' ;
i+=5;
}
```

THREE MARKS (PUBLIC QUESTIONS) (Q.NO 33)

1. **Write a C++ program to print multiplication table of a given number.** **[J-2024]**

```
#include<iostream>
using namespace std;
int main()
{
int num;
cout<<"Enter Number To Find Multiplication table ";
cin>>num;
for(int a=1;a < =10; a++)
{
cout<<num<<" * "<<a<<" = "<<num*a<<endl;
}
return 0;
}
```

Output :

```
Enter Number To Find Multiplication table   3
3x1=3     3x2=6     3x3=9    3x4=12    3x5=15
3x6=18  3x7=21  3x8=24  3x9=27    3x10=30
```

2. **Write a C++ program to display number from 5 to 1 using do-while loop** **[M-2024]**

```
#include<iostream>
using namespace std;
int main()
{
int n=5;
do
{
cout<<n<<”,”;
n--;
}
while(n>0);  [OR] while(n>=1);
return 0;
}
```

3. **Convert the following into octal number into binary number.** **(J-2023)**

i) 6137

```
 6       1       3      7
110    001    011    111
```

6127 = (110001011111)$_2$

ii) 245

```
 2      4     5
010   100    101
```

245 = (010100101)$_2$

iii) 472

```
 4      7      2
100   111   010
```

472 = (100111010)$_2$

4. **Write a C++ program to display numbers from 1 to 10. Except 5 using ‘for’ and ‘continue’ Statement.** **(M-2023)**

```
#include<iostream>
using namespace std;
int main()
{
int i;
for(i=1;i<=10;i++)
{
if(i==5)
{
continue;
}
cout<<i<<"\n";
}
return 0;
}
```

Output:

```
1,2,3.4,6,7,8,9,10
```

5. What is meant by computer ethics? **(Aug-2022)**

- ❖ Computer ethics deals with the procedures, values and practices that govern the process of consuming computer technology and its related disciplines without damaging or violating the moral values and beliefs of any individual, organization or entity.
- ❖ It is a set of moral principles that rule the behaviour of individuals who use computers.
- ❖ An individual gains knowledge to follow the right behaviour, using morals that are also known as ethics.

6. Write a c++ program to sum the numbers from 1 to 10 using 'for' loop. **(M-2022)**

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

<u>Output</u>

```
The sum of 1 to 10 is 55
```

7. Consider the following c ++ code and answer the questions **S-2020**

```
class Personal
{
int admno,rno;
protected:
char Name[20];
public:
personal();
void pentry();
void Pdisplay(); };
class Marks:private Personal
{ int M
protected:
char Grade[5];
public:
Marks();
void Mentry();
void Mdisplay(); };
class Result:public Marks
{
float Total,Agg;
char remark[5];
result();
void Rcalculate(); void Rdisplay();
```

1 **Which type of Inheritance is shown in the program?**

Multilevel inheritance

2 **Specify the visibility mode of base classes.**

Marks – Public visibility mode Personal- Private visibility mode.

3.**Name the base class(/es) and derived class (/es).**

Base Class ⟶ Personal Derived Class ⟶ Marks and Result

8. Read the following C++ code and answer the questions given below. **(M-2020)**

```
#include<iomanip>
#include<iostream>
using namespace std;
class product
{
int code, quantity;
float price;
public:
void assigndata();
void print();
int main()
{
product p1,p2;
cout<<"\n Memory allocation for object p1"<<sizeof(p1);
cout<<"\n Memory allocation for object p2"<<sizeof(p2);
return 0;}
```

<u>QUESTIONS</u>

1.What is the name of the class in the above program?

Answer: product

2. What are the data members are the class?

Answer: code, quantity, price

3. What is the memory size of the objects p1,p2?

Answer: Memory allocation for object p1 12
Memory allocation for object p2 12

9. **Write a short program to print following series: 1 3 5 7…75 (J-2019)**

```
#include<iostream>
using namespace std;
int main()
{
int n;
for(int i=1;i<=75,i+=2)
cout<<i<< "\t";
getch ( );
}
```

Output:

```
1 3 5 7 9 11 13 15 …..75
```

10. **Read the following C++ code and answer the questions given below. (M-2019)**

```
class student
{
int m,n;
public:
void add();
float calc();
}x1,x2;
```

Questions:

1) Identify the member of the class : m,n, add(), calc()

2) What is size of the objects x1,x2 in memory? x1 =8 bytes x2 = 8 bytes

IMPORTANT TOPICS (NUMBER SYSTEMS, METHODS SYNTAX WITH EXAMPLE

DECIMAL TO BINARY ,OCTAL , HEXA DECIMAL

1.	**Decimal to Binary Conversion**	**Convert $(65)_{10}$ into equivalent binary number** 2 65 2 32-1 2 16-0 $(65)_{10}$ = **$(1000001)_2$** 2 8-0 2 4-0 2 2-0 1-0
2.	**Decimal to Octal Conversion**	**Convert $(65)_{10}$ into its equivalent octal number** 8 65 8 8-1 $(65)_{10}$ = **$(101)_8$** 1-0
3.	**Decimal to Hexadecimal Conversion**	**Convert $(31)_{10}$ into equivalent hexadecimal number** 16 31 16 1-15 $(31)_{10}$ = **$(1F)_{16}$**
4.	**Fractional decimal to binary**	**Convert $(98.46)_{10}$ to binary:** **I. Integer Part: II. Fractional Part:** 2 98 0.46x2= 0.92 = 0 98 = **$(1100010)_2$** 2 49-0 0.92x2= 1.84 = 1 $(46)_{10}$ = $(.0110010)_2$ 2 24-1 0.84x2= 1.68 = 1 2 12-0 0.68x2= 1.36 = 1 $(98.46)_{10}$ = **$(1100010.0111010….)_2$** 2 6-0 0.36x2 = 0.72 = 0 2 3-0 0.72x2= 1.44 = 1 1-1 0.44x2= 0.88 = 0

Convert the following Decimal numbers to its equivalent Binary, Octal, Hexadecimal. 1) 1920 2) 255 3)126

1) 1920

Decimal to binary

2 1920
2 960-0 1920_{10} = **11100000000_2**
2 480-0
2 240-0
2 120-0
2 60-0
2 30-0
2 15-0
2 7-1
2 3-1
1-1

Decimal to octal

8 1920
8 240-0 1920_{10} = **3600_8**
8 30-0
3-6

Decimal to hexa decimal

16 1920
16 120-0 1920_{10} = **780_{16}**
7-8

2) 255

Decimal to binary

2 255
2 127-1 255_{10} = **11111111_2**
2 63-1
2 31-1
2 15-1
2 7-1
2 3-1
1-1

Decimal to octal

8 255
8 31-7 255_{10} = **377_8**
3-7

Decimal to hexa decimal

16 255
15-15 255_{10} = **FF_{16}**

3) 126

Decimal to binary

2 126
2 63-0 126_{10} = **1111110_2**
2 31-1
2 15-1
2 7-1
2 3-1
1-1

Decimal to octal

8 126
8 15-6 126_{10} = **176_8**
1-7

Decimal to hexa decimal

16 126
7-14 126_{10} = **$7E_{16}$**

BINARY TO DECIMAL, OCTAL,HEXA DECIMAL

1. Binary to Decimal Conversion

Positional Notation	**Weight**
2^0	1
2^1	2
2^2	4
2^3	8
2^4	16
2^5	32
2^6	64
2^7	128

Convert $(111011)_2$ into its equivalent decimal number.

Weight	32	16	8	**4**	2	1
Positional Notation	2^5	2^4	2^3	$\mathbf{2^2}$	2^1	2^0
Given number	1	1	1	**0**	1	1

= 32+16+8+0+2+1

= $(111011)_2$ = **$(59)_{10}$**

2. Binary to Octal Conversion

Octal	**Binary equivalent**
0	000
1	001
2	010
3	011
4	100
5	101

$(11010110)_2$

11010110 $(?)_8$

011 010 110

3 2 6

$(11010110)_2$ = **$(326)_8$**

3. Binary to Hexadecimal Conversion

$(1111010110)_2$ into Hexadecimal Number.

1111010110 $(?)_{16}$

0011 1101 0110

3 D 6

$(1111010110)_2$ = **$(3D6)_{16}$**

4. Fractional binary to decimal

Positional Notation	**Weight**
2^{-1} (1/2)	0.5
2^{-2} (1/4)	0.25
2^{-3} (1/8)	0.125
2^{-4} (1/16)	0.0625
2^{-5} (1/32)	0.03125
2^{-6} (1/64)	0.015625
2^{-7} (1/128)	0.0078125

11.011_2 Binary to decimal equivalent

$(11)_2 = 3$

2^1 2^0 . 2^{-1} 2^{-2} 2^{-3}

1 1 . 0 1 1

=3+ . (0x0.5+1x0.25+1x0.125)

= 3.375

$(11.011)_2$ = **$(3.375)_{10}$**

Convert the given Binary number into its equivalent Decimal, Octal and Hexadecimal number.

1) 101110101 2) 1011010 3) 101011111

1) 101110101

Decimal	**Octal**	**Hexadecimal**
= $1x2^8+0x2^7+1x2^6+1x2^5+1x2^4+0x2^3+1x2^2+0x2^1+1x2^0$	101 110 101	0001 0111 0101
= 256+64+32+16+4+1	5 6 5	1 7 5
101110101_2 = **373_{10}**	101110101_2 = **565_8**	101110101_2 = **175_{16}**

2) 1011010

Decimal	**Octal**	**Hexadecimal**
= $1x2^6+0x2^5+1x2^4+1x2^3+0x2^2+1x2^1+0x2^0$	001 011 010	0101 1010
= 64+16+8+2	1 3 2	5 A(10)
1011010_2 = **90_{10}**	1011010_2 = **132_8**	1011010_2 = **$5A_{16}$**

3) 101011111

Decimal	**Octal**	**Hexadecimal**
= $1x2^8+0x2^7+1x2^6+0x2^5+1x2^4+1x2^3+1x2^2+1x2^1+1x2^0$	101 011 111	0001 0101 1111
= 256+64+16+8+4+2+1	5 3 7	1 5 F(15)
101011111_2 = **351_{10}**	101011111_2 = **537_8**	101011111_2 = **$15F_{16}$**

OCTAL TO DECIMAL, BINARY

1. Octal to decimal conversions

Positional Notation	Weight
8^0	1
8^1	8
8^2	64
8^3	512
8^4	4096
8^5	32768

Convert $(1265)_8$ into its equivalent decimal number.

Weight	512	64	8	1
Positional Notation	8^3	8^2	8^1	8^0
Given number	1	2	6	5

$(1265)_8$ = 512x1+64x2+8x6+1x5

= 512+128+48+5

$\mathbf{(1265)_8 = (693)_{10}}$

2. Octal to binary conversion

$(6213)_8$ to equivalent binary number

6 2 1 3

110 010 001 011

$\mathbf{(6213)_8 = (110010001011)_2}$

Convert the following Octal numbers into Binary numbers. (A) 472 (B) 145 (C) 347 (D) 6247 (E) 645

Octal to binary:

(A) 472	**(B) 145**	**(C) 347**	**(D) 6247**	**(E) 645**
4 7 2	1 4 5	3 4 7	6 2 4 7	6 4 5
100 111 010	001 100 101	011 100 111	110 010 100 111	110 100 101
472_8 = $\mathbf{100111010_2}$	145_8=$\mathbf{001100101_2}$	347_8=$\mathbf{011100111_2}$	6247_8=$\mathbf{110010100111_2}$	645_8= $\mathbf{110100101_2}$

HEXADECIMAL TO DECIMAL, BINARY

1. Hexadecimal to Decimal Conversions

Positional Notation	Weight
16^0	1
16^1	16
16^2	256
16^3	4096
16^4	65536
16^5	1048576

(25F)16 into its equivalent Decimal number

Weight	256	16	1
Positional Notation	16^2	16^1	16^0
Given number	2	5	F(15)

$(25F)_{16}$ =2x256+5x16+15x1

=512+80+15

$\mathbf{(25F)_{16} = (607)_{10}}$

2. Hexadecimal to Binary Conversions

(8BC) into equivalent Binary numbers

8 B C

1000 1011 1100

$\mathbf{(8BC)_{16} = (100010111100)}$

Convert the following Hexadecimal numbers to Binary numbers (A) A6 (B) BE (C) 9BC8 (D) BC9

Hexadecimal numbers to Binary numbers:

(A) A6	**(B) BE**	**(C) 9BC8**	**(D) BC9**
A 6	B E	9 B C 8	B C 9
10 6	11 14	9 11 12 8	11 12 9
1010 0110	1011 1110	1001 1011 1100 1000	1011 1100 1001
$A6_{16}$ = $\mathbf{10100110_2}$	BE_{16}= $\mathbf{10111110_2}$	$9BC8_{16}$=$\mathbf{1001101111001000_2}$	$BC9_{16}$= $\mathbf{101111001001_2}$

BINARY REPRESENTATION FOR SIGNED NUMBERS

1's Compliment Representation

(-24)

2 24 24 = 11000
2 12-0 8 bit = 00011000
2 6-0 1s = **11100111**
2 3-0
1-1

2's Compliment Representation

(-24)

2 24 24 = 11000
2 12-0 8 bit = 00011000
2 6-0 1s = 11100111
2 3-0 1
1-1 **2s = 11101000**

Write the 1's complement number and 2's complement number for the following decimal numbers:
(A) 22 (B) -13 (C) -65 (D) -46

(A) 22
2 22 22 = 10110
2 11-0 8bit = **00010110**
2 5-1
2 2-1
1-0

(B) -13
2 13 -13 = 1101
2 6-1 8bit = 00001101
2 3-0 1^s = 11110010
1-1 1
2's **11110011**

(C) -65
2 65
2 32-1 - 65 = 1011111
2 16-1 8bit = 01011111
2 8-1 1s = 10100000
2 4-1 1
2 2-1 2s = **10100001**
1-0

(D) -46
2 46
2 23-0 - 46 = 101110
2 11-1 8bit = 00101110
2 5-1 1s = 11010001
2 2-1 1
1-0 2s = **11010010**

BINARY ARITHMETIC (ADDITION &SUBTRACTION)

1. Binary Addition Rules

A	B	Sum (A+B)	Carry
0	0	0	-
0	1	1	-
1	0	1	-
1	1	0	1

$1101010_2+101101_2$

	1	1		1				
		1	1	0	1	0	1	0
			1	0	1	1	0	1
+	1	0	0	1	0	1	1	1

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

1011_2+1001_2

1		**1**	**1**	
	1	0	0	1
	1	0	1	1
1	0	1	0	0

1011_2+1001_2 = 10100_2

23_{10} + 12_{10}

Step:1
2 23 23 = 10111
2 11-1 8bit = 00010111
2 5-1
2 2-1
1-0

Step:2
2 12 12 = 1100
2 6-0 8bit = 00001100
2 3-0
1-1

Step:3
23 = 00010111
12 = 00001100

35 = 00100011 **[23_{10} + 12_{10} = 35_{10}=00100011_2]**

1. Binary Subtraction Rules

A	B	Difference	Borrow
0	0	0	-
0	1	1	1
1	0	1	-
1	1	0	-

Extra : 1 0 (one zero) – 1 = 1

1101011_2 - 111010_2

		0	10	10				
		~~1~~	~~1~~	~~0~~	1	0	1	1
			1	1	1	0	1	0
-		0	1	1	0	0	0	1

1101011_2 - 111_2 = **110001_2**

1001010_2-10100_2

0	1	10	0	10		
~~1~~	~~0~~	0	~~1~~	0	1	0
		1	0	1	0	0
	1	1	0	1	1	0

1001010_2-10100_2 **= 110110_2**

$(-21)_{10}$ + $(5)_{10}$

Step:1
2 21 - 21 = 10101
2 10-1 8bit = 00010101
2 5-0 1s = 11101010
2 2-1
1-0 2s = 11101011

Step:2
2 5 5 = 101
2 2-1 8bit = 00000101
1-0

Step:3
- 21 = 11101011
5 = 00000101

-16 = 11110000 **[$(-21)_{10}$ + $(-16)_{10}$ = 11110000_2]**

Perform the following binary computations: (A) $10_{10} + 15_{10}$ (B) $–12_{10} + 5_{10}$ (C) $14_{10} – 12_{10}$ (D) $(–2_{10}) – (–6_{10})$

(A) $10_{10} + 15_{10}$

Step:1	**Step:2**	**Step:3**
2 10 10 = 1010	2 15 15 = 1111	10 = 00001010
2 5-0 8bit = 00001010	2 7-1 8bit = 00001111	15 = 00001111
2 2-1	2 3-1	
1-0	1-1	25 = 00011001 **[$10_{10} + 15_{10} = 25_{10}=00011001_2$]**

(B) $–12_{10} + 5_{10}$

Step:1	**Step:2**	**Step:3**
2 12 12 = 1100	2 5 5 = 101	- 12 = 11110100
2 6-0 8bit = 00001100	2 2-1 8bit = 00000101	5 = 00000101
2 3-1 1s = 11110011	1-0	
1		-7 = 11111001 **[$-12_{10} + 5_{10} = -7_{10}=11111001_2$]**
2s = 11110100		

(C) $14_{10} – 12_{10}$

Step:1	**Step:2**	**Step:3**
2 14 14 = 1110	2 12 - 12 = 1100	14 = 00001110
2 7-0 8bit = 00001110	2 6-0 8bit = 00001100	- 12 = 11110100
2 3-1	2 3-0 1s = 11110011	
1-1	1-1 1	2 = 100000010 **[$14_{10}-12_{10} = 2_{10}=100000010_2$]**
	2s = 11110100	

(D) $(–2_{10}) – (–6_{10})$

Step:1	**Step:2**	**Step:3**
2 2 -2 = 10	2 6 6 = 110	- 2 = 11111110
1-0 8bit = 00000010	2 3-0 8bit = 00000110	6 = 00000110
1s = 11111101	1-1	
1		4 = 100000100 **[$(-2)_{10} - (-6)_{10} = 4_{10}= 100000100_2$]**
2s = 11111110		

CHAPTER -2 (PART - 2) BOOLEAN ALGEBRA

LOGICAL OPERATIONS

1. AND operator

Y= A.B

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

2 OR operator

Y=A+B

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

3 NOT operator

Y=A

A	**A**
0	1
1	0

4. NAND operator

$Y=\overline{A.B}$

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

5. **NOR operator**

Y=$\overline{A.B}$

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

BASIC LOGIC GATES

1. **AND Gate**

AND gate C = AND B

Gate:

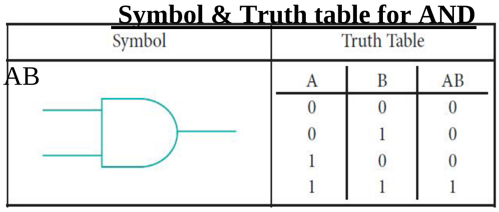
AND Operation: C = A.B or C = AB

Example: C = A.B

= 0.0

= 0

Symbol & Truth table for AND



A	B	AB
0	0	0
0	1	0
1	0	0
1	1	1

2. **OR Gate**

OR gate C = A OR B

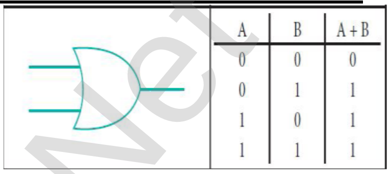
OR Operation: C = A+B

Example: C = A+B

= 1+1

= 1

Symbol & Truth table for AND Gate



A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

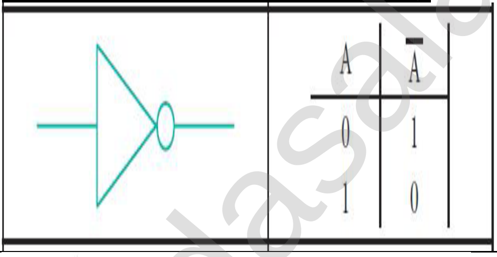
3 **NOT Gate**

NOT gate C = NOT A

NOT Operation: C = $\overline{A}$

Example: if A is 0, C = 0 =$\overline{1}$; On the other hand, if A is 1, C= 1 = 0

Symbol & Truth table for AND Gate:



A	$\overline{A}$
0	1
1	0

4. **NOR Gate**

Input		OR	Output
A	**B**		**C**
0	0	**0**	**1**
0	1	**1**	**0**
1	0	**1**	**0**
1	1	**1**	**0**

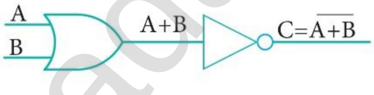
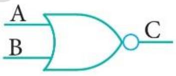


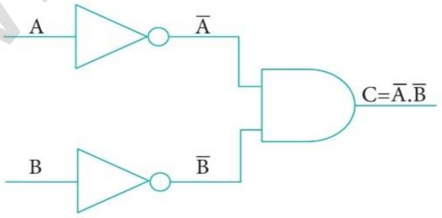
Fig. 2.7 Logic Circuit of NOR Gate

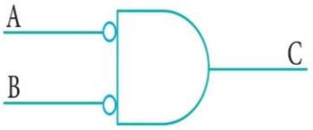


1. **Bubbled AND Gate**

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

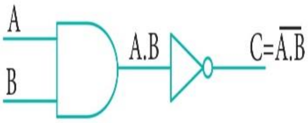
A+B = A.B



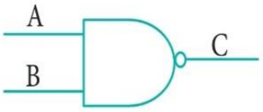


NAND Gate

Input		and	Output
A	**B**		**C**
0	0	**0**	**1**
0	1	**0**	**1**
1	0	**0**	**1**
1	1	**1**	**0**

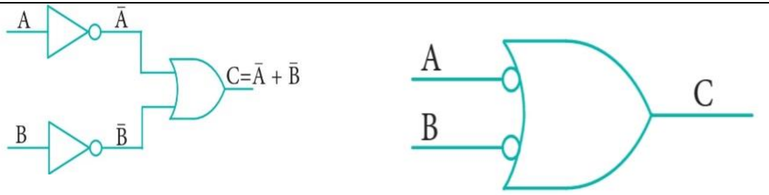


The logical symbol of NAND gate is



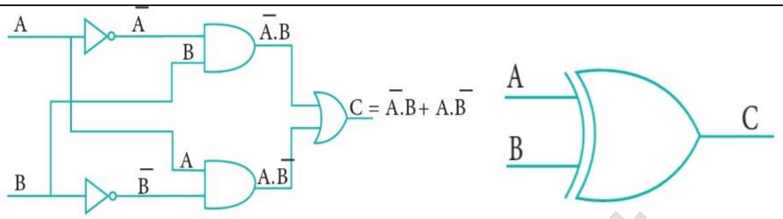
2 **Bubbled OR Gate**

Input		OR	Output
A	B		C
0	0	**0**	**1**
0	1	**1**	**1**
1	0	**1**	**1**
1	1	**1**	**0**



3. **XOR Gate**

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



4. **XNOR Gate**

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

is 0. The logic circuit of XNOR gate is

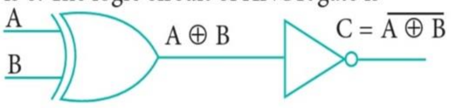


Fig. 2.17 Logic Circuit of XNOR Gate

logical symbol is

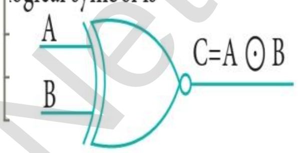


Fig. 2.18 Logic Symbol of XNOR Gate

1. **Theorems of Boolean Algebra**

1.Involution: $\overline{(A)} = A$	6. Commutative : A + B = B + A A . B = B . A
2. Absorption : A + (A . B) = A , A . (A + B) = A	7.Associative : A + (B + C) = (A + B) + C A . (B . C) = (A . B) . C
3.3rd Distributive : $A + \overline{A} . B = A + B$	8. Distributive : A . (B + C) = A . B + A . C A + (B . C) = (A + B) . (A + C)
4 .Identity : A + 0 = A A . 1 = A	9. Null Element : A + 1 = 1 ; A . 0 = 0
5. Complement : $A + \overline{A} = 1 ; A . \overline{A} = 0$	10 Idempotence : A + A = A, A . A = A 11. De Morgan's: $\overline{A + B} = \overline{A} . \overline{B}$ $\overline{(A . B)} = \overline{A} + \overline{B}$

CHAPTER – 5 WORKING WITH WINDOWS OPERATING SYSTEM

1. **Starting and Closing Applications:**

1. Click the Start button and then point to All Programs.
2. Point to the group that contains the application you want to start, and then click the application name.
3. You can also open an application by clicking Run on the Start menu, and the name of the application.
4. To quit an application, click the Close button in the upper right corner of the application window.
5. You can also quit an application by clicking on File → Exit and File → Close option in Windows 7.

2. **Create a new folder:**

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

3. **To create a folder in the desktop:**

Step 1: In the Desktop, right click → New → Folder. Step 2: A Folder appears with the default name "New folder".
Step 3: Type the name you want and press Enter Key. Step 4: The name of the folder will change.

4. **Create files in word pad:**

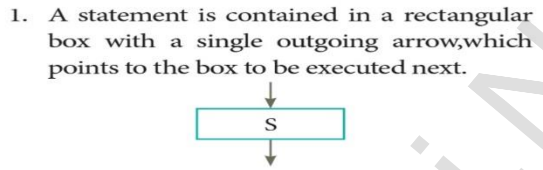
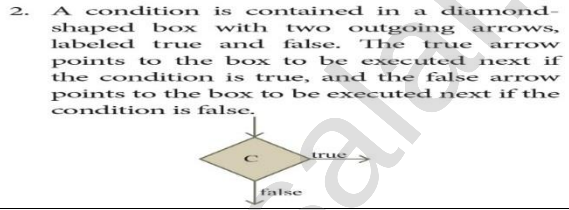
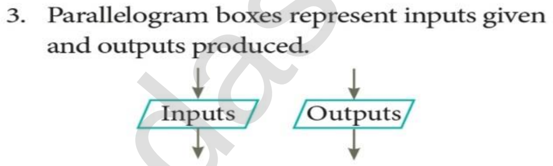
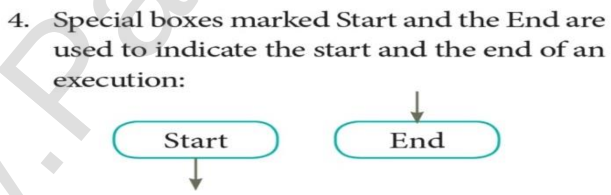
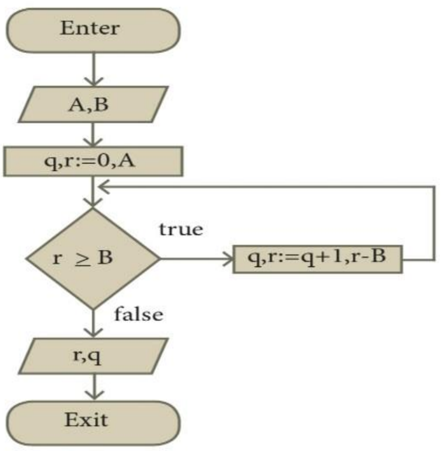
1. Click Start → All Programs → Accessories → Wordpad or Run → type Wordpad, click OK.
2. Type the contents in the workspace and save the file using File → Save or Ctrl + S.
3. Save As dialog box will be opened.
4. In the dialog box, select the location where you want to save the file by using **look in** drop down list box.
5. Type the name of the file in the **file name** text box.Click save button.

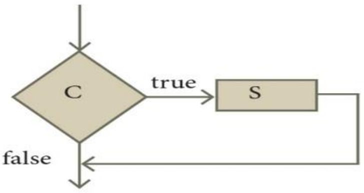
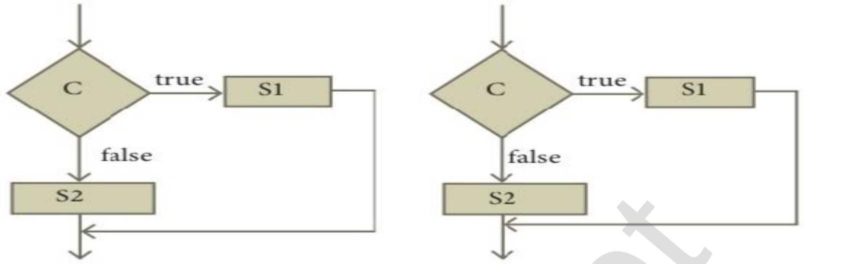
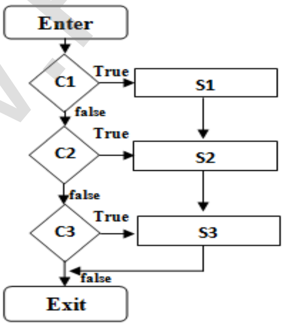
5. **Searching Files or folders using Computer icon:**

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

6. **Renaming Files or Folders** (Using the FILE Menu) :

1. Select the File or Folder you wish to Rename. 2. Click File→ Rename.
3. Type in the new name. 4. To finalise the renaming operation, press Enter

7.	**Renaming Files or Folders** (Using the Right Mouse Button) : 1. Select the file or folder you wish to rename. 2. Click the right mouse button over the file or folder. 3. Select Rename from the pop-up menu. 4. Type in the new name. 5. To finalise the renaming operation, press Enter. 6. The folder "New Folder" is renamed as C++.	
8.	**Renaming Files or Folders**(Using the Left Mouse Button) : 1. Select the file or folder you wish to rename. 2. Press F2 or click over the file or folder. 3. Type in the new name. 4. To finalise the renaming operation, press Enter.	
9.	**To delete a file or folder :** 1. Right- click the file or folder, select **Delete** option from the pop-pup menu or Click **File** → **Delete** or press **Delete** key from the keyboard. The file will be deleted and moved to the Recycle bin.	
10.	**Creating Shortcuts on the Desktop:** 1. Select the file or folder that you wish to have as a shortcut on the Desktop. 2. Right click on the file or folder. 3. Select **Send to** from the shortcut menu, then select Desktop from the sub-menu. 4. 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 – 7	**COMPOSITION AND DECOMPOSITION**
1.	**FLOW CHART** **(STATEMENT)**	 1. A statement is contained in a rectangular box with a single outgoing arrow,which points to the box to be executed next.
	(CONDITION)	 2. A condition is contained in a diamond-shaped box with two outgoing arrows, labeled true and false. The true arrow points to the box to be executed next if the condition is true, and the false arrow points to the box to be executed next if the condition is false.
	(PARALLELOGRAM)	 3. Parallelogram boxes represent inputs given and outputs produced.
	(SPECIAL BOXES)	 4. Special boxes marked Start and the End are used to indicate the start and the end of an execution:
	Flow chart for inter division	oxes. The algorithm is explained in Example 7.4.  Enter A,B q,r:=0,A true r ≥ B q,r:=q+1,r-B false r,q Exit

2.	**Draw a flowchart for conditional statement.**	
3.	**For the given two flowcharts write the pseudo code**	**For the given two flowcharts write the pseudo code.**  C true S1 false S2 C true S1 false S2 **PSEUDO CODE** 1. Enter A, B 2. Initialize Q=0, r=A 3. If r≥B, then do Q=Q+1; r = r-B else r,q 4. Exit **[OR]** **PSEUDO CODE -1** if condition is True Statement S1 else Statement S2 End if **PSEDO CODE-2** if condition is True Statement S1 Statement S2 else Statement S2 end if
4.	**If C is false in line 2, trace the control flow in this algorithm.**	**Answer:** S1;S2;S4 **[OR]** The control flow for the given algorithm is as follows: S1 S3 S4 The condition is false so it executes S3. In this case S2 skipped.
5.	**What is case analysis?**	1. case C1 2. S1 3. case C2 4. S2 5. case C3 6. S3
6.	**Draw a flowchart for -3case analysis using alternative statements.**	 Enter C1 True S1 false C2 True S2 false C3 True S3 false Exit

CHAPTER – 9 (PART – 1) INTRODUCTION TO C++

1. Character set:

Alphabets	A …. Z, a ….. z
Numeric	0 …. 9
Special Characters	+ - * / ~ ! @ # $ % ^& [ ] ( ) { } = >< _ \ | ? . , : ‘ “ ;
White space	Blank space, Horizontal tab (→), Carriage return (), Newline, Form feed
Other characters	C++ can process any of the 256 ASCII characters as data.

2. C++ Keywords

asm	auto	break	case	catch	using	while	try	union
char	class	const	continue	default	namespace	unsigned	typedef	virtual
delete	do	double	else	enum	bal	volatile	struct	switch
extern	float	for	friend	goto	static_cast	template	this	throw
if/ return	inline	int	long	new	const_cast	void	false	static
operator	private	protected	public	register	True	Size of	signed	short

3. Identifiers:

Identifiers	**Valid / Invalid**	**Reason for invalid**
Num,NUM, _add	Valid	-
total_sales	Valid	-
tamilMark	Valid	-
num-add	Invalid	Contains special character (-)
this	Invalid	This is one of the keyword. Keyword cannot be used as identifier names.
2myfile	Invalid	Name must start begins with an alphabet or an underscore

4. Numeric Constants (1) Integer Constants (or) Fixed point constants

(i) Decimal : Any sequence of one or more digits (0 …. 9)

Valid	Invalid
725	7,500 (Comma is not allowed)
-27	66 5(Blank space is not allowed)
4.56	9$ (Special Character not allowed)

(ii) Octal Any sequence of one or more octal values (0 …. 7)

Valid	**Invalid**
012	05,600(Commas is not allowed)
-027	04.56 (Decimal point is not allowed)**
+0231	0158 (8 is not a permissible digit in octal system)

(iii) Hexadecimal

Any sequence of one or more Hexadecimal values (0 …. 9, A …. F)

Valid	Invalid
0x123	0x1,A5 (Commas is not allowed)
0X568	0x.14E (Decimal point is not allowed like this)

5. Numeric Constants: (2)Real Constants (or) Floating point constants

Exponent: Example : 58000000.00 may be written as 0.58 × 108 or 0.58E8.

Mantissa (Before E)	Exponent (After E)
0.58	8

Example:

5.864 E1 101 × 5.864 ➔58.64 ➔ 5864 E-2 10-2 × 5864 ➔58.64 ➔ 0.5864 E2 102 × 0.5864 ➔58.64 ➔

Character constant

- A character constant in C++ is any valid single character enclosed within single quotes.
- Valid character constants : 'A', '2', '$' Invalid character constants : "A"

Escape sequences (or) Non-graphic characters:

Escape sequence	Non-graphical character	Escape sequence	Non-graphical character
\a	Audible or alert bell	\v	Vertical tab
\b	Backspace	\\	Backslash
\f	Form feed	\'	Single quote
\n	Newline or linefeed	\"	Double quote
\r	Carriage return	\?	Question Mark
\t	Horizontal tab	\On	Octal number
\0	Null	\xHn	Hexadecimal number

6. **Other Operators:**

The Comma operator	• Comma (,) is an operator in C++ used to string together several expressions. • The group of expression separated by comma is evaluated from left to right.
Sizeof	• This is called as compile time operator. It returns the size of a variable in bytes.
Pointer	* Pointer to a variable **&** Address of
Component selection	**.** Direct component selector **->** Indirect component selector
Class member opr	**::** Scope access / resolution **.*** Dereference **->*** Dereference pointer to class member

7. **The order of precedence:**

( ) [ ]	Operators within parenthesis are performed first
++, --	Postfix increment / decrement
++, --	Prefix increment / decrement
*, /, %	Multiplication, Division, Modulus
+, -	Addition, Subtraction
<, <=, >, >=	Less than, Less than or equal to, Greater than, Greater than or equal to
==, !=	Equal to, Not equal to
&&	Logical AND
||	Logical OR
?:	Conditional Operator
=	Simple Assignment
+=, -=, *=, /=	Shorthand operators
,	Comma operator

8. **Punctuators:**

Separator	**Description**	**Example**

Curly braces { }	Opening and closing curly braces indicate the start and end of a block of code. A block of code containing more than one executable statement. These statements together are called as "compound statement"	int main ( )
		{
		int x=10, y=20, sum;
		sum = x + y;
		cout << sum;
		}

Parenthesis ( )	Opening and closing parenthesis indicate function calls and function parameters.	clrscr( ); int main ( )

Square brackets [ ]	It indicates single and multidimensional arrays.	int num[5];
		char name[50];

Comma ,	It is used as a separator in an expression.	int x=10, y=20, sum;

Semicolon ;	Every executable statement in C++ should terminate with a semicolon	int main ( )
		{
		int x=10, y=20, sum;
		sum = x + y;
		cout << sum;
		}

Colon :	It is used to label a statement.	private:

**Comments
//
/* */**
	// Single line comment
	/* ……….. */ Multiline comment
		/* This is written by me
		to learn CPP */
		int main ( )
		{
		int x=10, y=20, sum;
		// to sum x and y
		sum = x + y;
		cout << sum;
		}

9. **Input operator:**

cin >> num;	Pre-defined object cin extracts a value typed on keyboard and stores it in variable num.
cin >>x >> y;	This is used to extract two values. cin reads the first value and immediately assigns that to variable x; next, it reads the second value which is typed after a space and assigns that to y. Space is used as a separator for each input

10 **Output Operator:**

cout << "Welcome";	Pre-defined object cout sends the given string "Welcome" to screen.
cout << "The sum = " << sum;	First, cout sends the string "The Sum = " to the screen and then sends the value of the variable sum; Usually, cout sends everything specified within double quotes or single quotes i.e., string or character constants, except non-graphic characters.
cout <<"\n The Area: " <<3.14*r*r;	First, cout sends everything specified within double quotes except \n to the screen, and then it evaluates the expression 3.14*r*r and sends the result to the screen. \n – is a non graphic character constant to feed a new line.
cout << a + b ;	cout sends the sum of a and b to the output console (monitor)

11 **Cascading of I/O operators:**

- The multiple use of input and output operators such as >> and << in a single statement is known as cascading of I/O operators.

Cascading cout:	**Cascading cin - Example:**
int Num=20;	cout >> "Enter two number: ";
cout << "A=" << Num;	cin >> a >> b;

12 **Working with Dev C++:**

- It can be downloaded from **http://www.bloodshed.net/dev/devcpp.html**

1. After installation Dev C++ icon is available on the desktop. Double click to open IDE.
2. To create a source file, Select File → New → Source file or Press Ctrl + N.
3. In the screen that appears, type your C++ program, and save the file by clicking File → Save or Pressing Ctrl + S. It will add .cpp by default at the end of your source code file. No need to type .cpp along with your file name.
4. After save, Click Execute → Compile and Run or press F11 key.

	CHAPTER – 9 (PART – 2) DATA TYPES VARIABLES AND EXPRESSIONS	
1	**Variable declaration**	<data type> <variable name>; **Ex:** int num1, num2, sum;
2	**int data type**	**Ex:** int num=12;
3	**char data type**	**Ex:** char c='A'; cout<<ch ;
4	**float data type**	**Ex:** float num=13.4;
5	**Declaration of Variables**	<data type> <var1>, <var2>, <var3> …… <var_n>; **Ex:** int num1, num2, sum;
6	**Initialization of variables**	**Ex:** int num = 100; float pi = 3.14; double price = 231.45;

7	**Dynamic Initialization**	**Ex:** int num1, num2, sum; sum = num1 + num2;
		Final answer: int sum = num1+num2;

8	**References**	<type> <& reference_variable> = <original_variable>;
9	**endl (End the Line)**	endl – Inserts a new line and flushes the buffer. • '\n' - Inserts only a new line. **Ex:** cout << "\n The value of num = " << num; cout << "The value of num = " << num <<endl;
10	**setw ( )**	setw(number of characters)
11	**setprecision ( )**	setprecision (number of digits);
12	**Constant Expression**	int num=100;
13	**Integer Expression**	sum=num1+num2; avg=sum/5;
14	**Floating Expression**	Area=3.14*r*r;
15	**Relational Expression**	x>y; a+b==c+d;
16	**Logical Expression**	(a>b)&& (c==10);
17	**Bitwise Expression**	x>>3; a<<2;
18	**Pointer Expression**	int *ptr;
19	**Explicit type conversion**	(type-name) expression;
	CHAPTER – 10 FLOW OF CONTROL	
1	**Null statement**	; // it is a null statement

2.	**Compound statement**	{ statement1; statement2; statement3; }
		Ex: { int x, y; x = 10; y = x + 10; }

3.	**if statement**	if (expression) Ex: **if(age>=18)**
		true-block;
		statement-x;

4.	**if-else statement**	if (expression) { True-block; } else { False-block; } Statement-x
5.	**Nested if**	**Inside if part:** **Inside else part** **Both if part and else part**

		if (expression-1)
		{
		if (expression-2)
		{
		True_Part_Statements;
		}
		else
		{
		False_Part_Statements;
		}
		}
		else
		body of else part;
		if (expression -1)
		{
		body of true part;
		}
		else
		{
		if (expression -2)
		{
		True_part_statements;
		}
		else
		{
		False_Part_statements;
		} }
		if (expression -1)
		{
		if (expression)
		{
		True_Part_Statements;
		}
		else
		{
		False_Part_Statements;
		} }
		else
		{
		if (expression)
		{
		True_Part_Statements;
		}
		else
		{
		False_Part_Statements;
		} }

6.	**if -else-if ladder**	if (expression 1) { Statement-1 }
		else
		if(expression 2) { Statement-2 }
		else
		if (expression 3) { Statement-3 }
		else
		{ Statement-4 }

7.	**The ?: Alternative to if- else**	expression 1? expression 2 : expression 3

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

9.	**For loop**	for (initialization(s); test-expression; update expression(s))
		{
		Statement 1;
		Statement 2;
		…………
		}
		Statement-x;

10	**While loop**	while (Test expression)
		{
		Body of the loop;
		}
		Statement-x;

11	**Do-while loop**	do
		{
		Body of the loop;
		} while(condition);

12	**Nesting of for**	for (initialization(s); test-expression; update expression(s))
		{
		for (initialization(s); test-expression; update expression(s)
		{
		statement(s);
		}
		statement(s);
		}

13	**Nesting of while**	while(condition)
		{
		while(condition)
		{
		statement(s);
		}
		statement(s); }

14	**Nesting of do-while**	do
		{
		statement(s);
		do
		{
		statement(s);
		}while(condition);
		} while(condition);

15	**goto statement**	Syntax1 Syntax2 goto label; label: -------------- ------------- -------------- ------------- -------------- -------------- label: goto label;
	CHAPTER -11 FUNCTIONS	

1.	**getchar() and putchar() functions**	cout<<"\n Type a Character : ";
		char ch = getchar();
		cout << "\n The entered Character is: ";
		putchar(ch);
		return 0;

2.	**gets() and puts() functions**	char str[50];
		cout<<"Enter a string : ";
		gets(str);
		cout<<"You entered: "
		puts(str);
		return(0);

3.	**isalnum()**	int isalnum (char c) **Ex:** int r = isalnum(‘5’); cout << isalnum(‘A’) <<’\t’<<r;

4.	**isalpha()**	isalpha(char c)
		int n = isalpha(‘3’); cout << isalpha('a');

5.	**isdigit()**	isdigit(char c)

6.	**islower()**	islower(char c)
		char ch = 'n'; int n = islower(ch); int n = islower(‘P’);

7.	**isupper()**	isupper(char c)
		int n=isupper(‘A’); int m=isupper(‘a’);

8.	**toupper()**	char toupper(char c);
		char c = toupper('k’); cout <<toupper(‘B’);

9.	**tolower()**	char tolower(char c) char c = tolower('K’); cout <<tolower(‘b’);
10	**strcpy()**	strcpy(Target String, Source String)
11	**strlen()**	strlen(string)
12	**strcmp()**	strcpy(String1, String2)
13	**strcat()**	strcat(Target, source)
14	**strupr()**	strcat(string)
15	**strlwr()**	strlwr(string)

16	**Function Definition**	Return_ Data_ Type Function_ name (parameter list)
		{
		Body of the function
		}

17	**Accessing a function**	1 display() calling the function without a return value and without any argument 2 display (x, y) calling the function without a return value and with arguments 3 x = display() calling the function with a return value and without any argument 4 x = display (x, y) calling the function with a return value and with arguments
18	**Default arguments**	**Ex :** void defaultvalue(int n1=10, n2=100);

19	**Constant Arguments**	<returntype><functionname> (const <datatypevariable=value>)
		Ex: int minimum(const int a=10);
		float area(const float pi=3.14, int r=5);

20	**Inline function**	inline returntype functionname(datatype parameter 1, … datatype parameter n)

21	**The return statement**	return expression/variable;
		Ex : return(a+b); return(a);

		return; // to terminate the function
22	**Returning values**	int add (int, int); add (int, int);

23	**Class Scope**	class student
		{
		private :
		int mark1, mark2, total; };

	CHAPTER -12 ARRAYS AND STRUCTURES	

1.	One-dimensional array	<data type><array_name> [<array_size>];
		Ex: int num[10];

2.	One-dimensional array (Initialization)	<datatype> <array_name> [size] = {value-1,value 2,…………… ,value-n};
		Ex: int age[5]={19,21,16,1,50};

3.	Character Array (String) creation	Array declaration is: char array_name[size]; **Ex:** char country[6];
4.	**String** (Initialization)	char array_name[size]={ list of characters separated by comma or a string } ; **Ex:** char country[6]="INDIA";

5.	Two-dimensional array	data-type array_name[row-size][col-size];
		Ex: int A[3][4];

6.	Initialization of Two-Dimensional array	int matrix[4][3]={
		{10,20,30},// Initializes row 0
		{40,50,60},// Initializes row 1
		{70,80,90},// Initializes row 2
		{100,110,120}// Initializes row 3
		};
		int matrix[4][3]={10,20,30,40,50,60,70,80,90,100,110,120};

7.	Accessing the two-dimensional array	matrix[0][0]=10;// Assign 10 to the first element of the first row
		matrix[0][1]=20;// Assign 20 to the second element of the first row
		matrix[1][2]=60;// Assign 60 to the third element of the second row
		matrix[3][0]=100;// Assign 100 to the first element of the fourth row

8.	Array of strings (Initialization)	char Name[6][10];
		Ex:char Name[6][10] = {"Mr. Bean", "Mr.Bush", "Nicole", "Kidman", "Arnold","Jodie"};

9.	Declaring and defining structures	struct structure_name {
		type member_name1;
		type member_name2;
		} reference_name;
		Example:
		struct Student
		{
		long rollno;
		Int age;
		Float weight;
		};

10	Referencing Structure Elements	balu.rollno balu.age balu.weight frank.rollno frank.age frank.weight
11	**(Anonymous Structure Vs Named Structure)**	struct { long rollno; int age; float weight; } student;

12	Initializing structure elements	**Ex:**
		balu.rollno= "702016";
		balu.age= 18;
		balu.weight= 48.5; balu={702016, 18, 48.5};

13	Structure Assignment	struct Student
		{
		Structure assignment is possible only if both structure variables/objects are same type.
		int age;
		float height, weight;
		}mahesh;

	CHAPTER -14 CLASSES AND OBJECTS	

1.	**CLASS DECLARATION**	class class-name
		{
		private:
		variable declaration;
		function declaration;
		protected:
		variable declaration;
		function declaration;
		public:
		variable declaration;
		function declaration;
		};

2.	**Definition of class members**	Class result
		{
		Private;
		char name [10];
		int rollno,mark1, mark2, total;
		Public:
		void accept();
		void display();
		};

3.	**Outside the class definition**	return_type class_name :: function_name (parameter list)
		{
		function definition
		}

4.	**Referencing class members**	Object_name . function_name(actual parameter);

5.	**Constructors**	struct sum
		{
		int n1,n2;
		};
		class add
		{
		int num1,num2;
		};
		int main()
		{
		int arr[]={1,2,3}; //declaration and initialization of array
		sum s1={1,1}; //declaration and initialization of structure object
		add a1={0,0}; // class object declaration and initialization throws compilation error
		}

6.	**Declaration and Definition**	class Sample
		{
		int i,j;
		public :
		int k;
		Sample()
		{
		i=j=k=0; //constructor defined inside the class
		}
		};

7.	**Default Constructors**	class Data, Data ::Data()
8.	**Parameterized Constructors**	**Ex:** Data :: Data(int,int);
9.	**Copy Constructors**	When an object is passed by reference to an instance of its own class **Ex:** Data d1, d2 (d1); // d2(d1) calls copy constructor
10	**Explicit call**	simple s1=simple(10,20); //explicit call
	CHAPTER -15 POLYMORPHISM	

1.	**Function prototype**	float area_circle(float radius) // to calculate the area of a circle
		float area_triangle(float half,floatbase,float height) // to calculate the area of a triangle
		float area_rectangle(float length , float breadth) // to calculate the area of a rectangle

2.	**Operator Overloading**	Return Type class name :: Operator Operator Symbol (argument list)
		{
		\\ Function body
		}

	CHAPTER -16 INHERITANCE	

1.	**Derived Class and Base class**	class derived_class_name :visibility_mode base_class_name
		{
		// members of derivedclass
		};

CHAPTER -9 TO 16 IMPORTANT QUESTIONS

CHAPTER -9 INTRODUCTION TO C++

1. **The following constants are of which type? 1) 26 2) 015 3) 0xF 4) 014.9**

1) 26 – Integer 2) 015 – Octal 3) 0xF – Hexadecimal 4) 014.9 – Floating

2. **Write the following real constants into the exponent form: 1) 32.179 2) 8.124 3) 0.00007**

1) 32.179 = 32179E-3 2) 8.124 = 8124E-3 3) 0.00007 = 7x10^{-5} = 7E-5

3. **Write the following real constants into the fractional form: 1) 0.23E4 2) 0.517E-3 3) 0.5E-5**

1) 0.23E4 = 2300 **2) 0.517E-3 =** 0.517x10^{-3} = 0.000517 **3) 0.5E-5** = 0.5x10^{-5}=0.000005

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

(marks ==75)&&(grade ==’A’)

5. **C++ Program to find the total marks of three subjects**

```
#include <iostream>
using namespace std;
int main()
{
int m1, m2, m3, sum;
cout << "\n Enter Mark 1: ";
cin >> m1;
cout << "\n Enter Mark 2: ";
cin >> m2;
cout << "\n Enter Mark 3: ";
cin >> m3;
sum = m1 + m2 + m3;
cout << "\n The sum = " << sum;
}
```

```
#include<iostream>
using namespace std;
int main()
{
 int m1,m2,m3,sum;
 float avg;
 cout << "\n Enter Mark 1: ";
  cin >> m1;
 cout << "\n Enter Mark 2: ";
 cin >> m2;
 cout << "\n Enter Mark 3: ";
cin >> m3;
 sum = m1 + m2 + m3;
avg=m1+m2+m3;
cout << "\n The sum = " << sum;
cout << "\n The average = " << avg;
}
```

Output

```
Enter Mark 1: 60
Enter Mark 2: 78
Enter Mark 3:  90
The sum = 228
The average = 76
```

6. **C++ program to find the area of a circle**

```
#include <iostream>
using namespace std;
int main()
{
int radius;
float area;
cout << “\n Enter Radius: “;
cin >> radius;
area = 3.14 * radius * radius;
cout << “\n The area of circle = “ << area;
}
```

Output

```
Enter Radius = 4
The area of circle = 50.24
```

7. **point out the errors in the following program.**

```
Using namespace std;
int main( )
{
cout << “Enter a value ”;
cin << num1 >> num2
num+num2=sum;
cout >> “\n The Sum= ” >> sum;
```

1.#include<iostream> (Pre-processor statement missing)
2. Using namepace srd; (Keyword must be in lower case)
3. Enter a value (Prompt should be (Enter two values” because cin contain two variables.)
4. cin << num1 >> num2 (Variables are not declared)
5. num+num2=sum;(It should be replaced as sum=num1+num2)
6.Reurun statement is missing.
7.Close bracket is missing }.

Correct program:

```
#include<iostream>
using namespace std;
int main(
{
int num1,num2,sum;
cout<<”Enter two values”;
cin>>num1>>num2
sum=num1+num2;
cout<<”\n The sum=”<<sum;
return 0;
}
```

8. Point out the type of error in the following program:

```
#include <iostream>
using namespace std;
int main()
{
int h=10; w=12;
cout << "Area of rectangle " << h+w;
}
```

```
#include<iostream>
using namespace std;
int main()
{
 int h=10,w=12;
cout<<"Area of rectangle"<<h*w;
 }
```

Output:

```
Area of rectangle 120
```

Answer:

- Syntax error exists.
- For example, int h=10;w=12; should written as int h=10,w=12;
- There is also logical error in the above program. The formula for rectangle area is given wrong.

9. What is wrong with the following C++ statement? long float x; [Instead of long float x use double x;]

10 What is wrong with the following statement? const int x;

- In the above statement x must be initialized. It is missing. It may rewritten as cons int x=100;

11 Write C++ programs to interchange the values of two variables.

a. Using the third variable

```
#include<iostream>
using namespace std;
int main()
{
int x,y,t;
cout<<"\nEnter two numbers";
cin>>x>>y;
cout<<"\nValues before interchange x="<<x<<"\ty="<<y;
t=x;
x=y;
y=t;
cout<<"\nValues after interchange x="<<x<<"\ty="<<y;
return 0;
}
```

b. Without using third variable

```
#include<iostream>
using namespace std;
int main()
{
int x,y;
cout<<"\nEnter two numbers";
 cin>>x>>y;
 cout<<"\nValues before interchange x="<<x<<"\ty="<<y;
 x=x+y;
 y==x-y;
 x=x-y;
 cout<<"\nValues after interchange x="<<x<<"\ty="<<y;
return 0;
 }
```

12 Write C++ programs to do the following:

a. To find the perimeter and area of a quadrant

```
#include<iostream>
using namespace std;
int main()
{
float r,pm,area;
cout<"\nEnter radius";
cin>>r;
area=3.14*r*r/4;
pm=3.14*r/2;
cout<<"\nQuadrant Area="<<area;
cout<<"\nQuadrant Perimeter = "<<pm;
return 0;
}
```

Output:

```
Enter radius 10
Quadrant Area = 78.5
Quadrant Perimeter = 15.7
```

b. To find the area of triangle.

```
#include<iostream>
using namespace std;
int main()
{
 float b,h,area;
 cout<<"\nEnter b and h value of triangle ";
cin>>b>>h;
area=b*h/2;
 cout<<"\nBase value = "<<b<<"Height = "<<h<<"Triangle Area = "<<area;
 return 0;
 }
```

Output:

```
 Enter b and h value of triangle 5 6
 Base value = 5 Height = 6 Triangle Area = 15
```

c. To convert the temperature from Celsius to Fahrenheit.

```
#include<iostream>
using namespace std;
int main()
{
float c,f;
cout<<"\nEnter Celsius value":
cin>>c;
f=9*c/5+32;
cout<<"\nTemperature in Celsius = "<<c;
cout<<"\nTemperature in Fahrenheit = "<<f;
return 0;
```

Output:

```
Enter Celsius value 40
Temperature in Celsius = 40
Temperature in Fahrenheit = 104
```

13 **Write a C++ to find the total and percentage of marks you secured from 10th Standard Public Exam. Display all the marks one-by-one along with total and percentage. Apply formatting functions.**

```
#include<iostream>
#include<iomanip>
using namespace std;
int main()
{
int tam,eng,mat,sci,soc,total,avg;
char name[30];
cout<<"\nEnter name of the student";
cin>>name;
cout<<"\nEnter Tamil mark";
cin>>tam;
cout<<"\nEnter English mark";
cin>>eng;
cout<<"\nEnter Maths mark";
cin>>mat;
cout<<"\nEnter Science mark";
cin>>sci;
cout<<"\nEnter Social mark";
cin>>soc;
total=tam+eng+mat+sci+soc;
avg=total/5;
cout<<\n\t\t10th Standard Public Exam Mark"<<endl<<endl;
cout<<setw(30)<<"Name of the student"<<name<endl<<endl;
cout<<setw(30)<<setfill(' ')<<"Tamil mark:"<<setw(3)<<setfill('0')<tam<<endl<<endl;
cout<<setw(30)<<setfill(' ')<<"English mark:"<<setw(3)<<setfill('0')<tam<<endl<<endl;
cout<<setw(30)<<setfill(' ')<<"Maths mark:"<<setw(3)<<setfill('0')<tam<<endl<<endl;
cout<<setw(30)<<setfill(' ')<<"Science mark:"<<setw(3)<<setfill('0')<tam<<endl<<endl;
cout<<setw(30)<<setfill(' ')<<"Social mark:"<<setw(3)<<setfill('0')<tam<<endl<<endl;
cout<<setw(30)<<setfill()<<"Total Marks" setw(3)<<setfill('0')<<total<<endl<<endl;
cout<<setw(30)<<setfill(" ")<<"Average mark:"<<setw(3)<<setfill("0")<<avg<<endl<<endl;
return 0;
}
```

Output:

```
Enter name of the student Pravit
Enter Tamil mark 89
Enter English mark 92
Enter Maths mark 100
Enter Science mark 99
Enter Social Science mark 95
```

```
10th Standard Public Exam Mark
Name of the student: Pravit
Tamil mark :089
English mark : 092
Maths mark : 100
Science mark :099
 Social Science mark :095
 Total Marks: 475
 Average mark :095
```

CHAPTER – 10 FLOW OF CONTROL

1. **Write C++ program to solve the following problems:**

Program to input a character and to print whether a given character is an alphabet, digit or any other character.

```
#include<iostream>
using namespace std;
int main ()
{
char ch;
cout<<"Enter any character:";
ch=getchar();
if (isalpha (ch))
cout<<"Alphabet";
else if (isdigit(ch))
cout<<"Number";
else
cout<<"Special Character";
return 0;
}
```

2. **Program to print whether a given character is an uppercase or a lowercase character or a digit or any other character. use ASCII codes for it. The ASCII codes are as given below:**

Characters	**ASCII Range**
'0' - '9'	**48-57**
'A'-'Z'	**65-90**
'a' - 'z'	**97-122**
other characters	**0 255 excluding the above mentioned codes**

```
#include<iostream>
using namespace std;
int main()
{
char ch;
cout<< "Enter a character"<<endl;
cin>>ch;
```

```
if ((ch>=65 & & ch <=90)
cout << "Alphabet : upper case";
else if ((ch>= 97 && ch <= 122))
cout <<"Alphabet : Lower case";
else if (ch>=48&& ch<=57)
cout <<"Digt";
else
cout<<"Special Character";
return 0;
}
```

3. **Program to calculate the factorial of an integer.**

```
#include<iostream>
using namespace std;
int main ()
{
int n, i, f = 1 cout<<"Enter a number"<<endl;
for ( i = 1 ; i<=n; i++)
cout<<"Factorial of a given number =" <<f<<endl;
return 0;
}
```

4. **Program to print fibonacci series i.e., 0112 3 58.......**

```
#include<iostream>
using namespace std;
int main ()
{
int n, i, a = 6 , b = 1
cout<<"Enter number of terms"<<endl;
cin>>n;
cout<"Fibonacci series"<<endl;
cout<<a<<"\t"<<b;
{
for(i=3;i<=n;; i++)
c = a + b
cout<<c<<"\t";
a =b:
b = c
}
return 0;
}
```

5. **Programs to produce the following design using nested loops**

A)

```
A
A B
A B C
A B C  D
A B C  D  E
A B C  D  E F
```

```
#include<isotream>
using namespace std;
int main ()
{
for(int i = 1 ; i <= 5 ;i++)
{
for(int j = 5 j >= i j--)
}
cout<<j"\t";
cout<<'n';
}
return 0;
}
```

B]

```
5  4  3  2  1
5  4  3  2
5  4  3
5  4
5
```

```
#include<iostream>
using namespace std;
int main ()
{
 int n = 65, rows;
cout<<"Enter number of rows: ";
cin>>rows;
for (int i = 65; i<=(65+rows-1); i++)
{
 for(int j = 65; j<=i; j++)
 {
  cout<<(char)j>>"\t";
  }
  return 0;
 }
```

CHAPTER-11 FUNCTIONS

1. **Program that reads two strings and appends the first string to the second. For example, if the first string is entered as Tamil and second string as nadu, the program should print Tamilnadu. Use string library header.**

```
#include<iostream>
#include<stdio.h>
using namespace std;
int main()
{
char s1[ ]="Tamil",s2[ ]="nadu";
strcat(s1,s2);
puts(s1);
system("pause");
return 0;
}
```

2. **. Program that reads a string and converts it to uppercase. Include required header files.**

```
#include <iostream>
#include <ctype.h>
using namespace std;
int main()
{
char ch;
cout<<"Enter the Character";
ch-getchar();
cout<<"The Character is changed to Upper Case="<<toupper(ch);
system("pause");
return 0;
}
```

3. **Program that checks whether a given character is an alphabet or not. If it is an alphabet, whether It is lowercase character or uppercase character? Include required header files.**

```
#include<iostream>
#include<ctype.h>
using namespace std;
int main()
{
char ch;
cout<<"Enter character"<<endl;
cin>>ch;
if (isalpha(ch))
cout<<"It is an alphabet"<<endl;
else
cout<<"It is not an alphabet"<<endl;
if(isupper(ch))
else
cout<<"It is in uppercase"<<endl;
cout<<"It is in lowercase"<<endl;
return 0;
}
```

4. **Write definition for a function sum series () in c ++ with two arguments/parameters - double x and int n. The function should return a value of type double and it should perform sum of the following series:**
x-x2 /3!+* 3/5 ! - x4/7! + x5 / 9!...up to n terms.

```
#include<iostream>
#include <math.h>
using namespace std;
void sumseries(double x, int n)
{
double sum=0, sign=-1;
int i, c = 1 ;
for ( i = 1; i <= n ;i++)
{
int f=1;
for (int j=1; j<=c; j++)
{f=fj;}
sign = sign * -1;
sum = sum + (sign * (pow(x,i)/f);
c = c+2;
}
cout<<"Sum of the series="<<sum;
}
int main()
{
double x;
int n;
cout<<"Enter the value of x"<<endl;
cin>>x;
cout<<"Enter the number of terms"<<endl;
cin>>n;
sumseries(x, n);
return 0;
}
```

5. **Program that invokes a function calc () which Intakes two integers and an arithmetic operator and prints the corresponding result.**

```
#include<iostream>
using namespace std;
void cale (int a, int b, char ch)
{
if (ch'+') cout<<a+b;
if (ch=='-') cout<<a-b;
if (ch=='*') cout<<a*b;
if (ch=='/') cout<<a/b;
if (ch=='%') cout<<a%b;
}
int main ()
{
int a, b;
char ch;
cout<<"Enter first number"<<endl;
cin>>a;
cout<<"Enter second number"<<endl;
cin>>b;
cout<<"Enter Arithmetic operator"<<endl;
cin>>ch;
calc(a, b, ch);
}
```

CHAPTER-12 ARRAYS AND STRUCTURES

1. **Write a program to accept the marks of 10 students and find the average, maximum and minimum marks.**

```
#include<iostream>
int main()
{
int m[10], i, max=0, min=0, sum=0;
float avg = 0;
for(i=0; i<10; i++)
{
cout<<"Enter Marks of student"<<i+1<<endl;
cin>>m[i];
sum=sum+m[i];
}
avg=sum/10;
cout<<"Average="<<avg<<endl;
max-min-m[0];
for(i=0; i<10; i++)
{
if (m[i]>=max
        max = m[i];
if(m[i]<=min
       min = m[i];
}
cout<<"maximum mark ="<<max<<endl;
cout<<"minimum mark ="<<min<<endl;
return 0;
}
```

CHAPTER-14 CLASSES AND OBJECTS

1. **Define a class Employee with the following specification: private members of class Employee empno- integer ename – 20 characters basic – float netpay, hra, da, - float calculate () – A function to find the basic+hra+da with float return type public member functions of class employee havedata() – A function to accept values for empno, ename, basic, hra, da and call calculate() to compute netpay dispdata() – A function to display all the data members on the screen.**

```
#include<iostream.h>
#include<string.h>
class Employee
{
int empno;
char ename[20];
float basic, netpay,hra,da;
float calculate();
public:
void havedata()
{
cout<<"Enter Employee Number"<<endl;
cin>>empno;
cout<<"Enter Employee Name"<<endl;
gets(ename);
cout<<"Enter Basic Pay"<<endl;
cin>>basic;
cout<<"Enter HRA"<<endl;
cin>>hra;
cout<<"Enter DA"<<endl;
cin>>da;
calculate ();
}
float calculate ()
{
netpay = basic + hra + da;
return netpay;
}
void dispdata()
{
cout<<"Employee Number:"<<empno<<endl;
cout<<"Employee Name:"<<ename<<endl;
cout<<"BASIC PAY:"<<basic<<endl;
cout<<"HRA:"<<ha<<endl;
cout<<"DA:"<<da<<endl;
cout<<"Netpay:"<<calculate<<endl;
}
};
int main ()
{
Emplyee e;
e.havedata ();
e.calculate ();
e.dispdata ();
return 0; }
```

CHAPTER-15 POLYMORPHISM

1. **Suppose you have a Kitty Bank with an initial amount of Rs500 and you have to add some more amount to it. Create a class 'Deposit' with a data member named 'amount' with an initial value of Rs500. Now make three constructors of this class as follows: 1. without any parameter - no amount will be added to the Kitty Bank 2. having a parameter which is the amount that will be added to the Kitty Bank 3. whenever amount is added an additional equal amount will be deposited automatically Create an object of the 'Deposit' and display the final amount in the Kitty Bank.**

```
#include<iostream>
Class Deposit
{
int amount;
Deposit ()
{
amount = 0;
}
Deposit (int d)
}
```

```
amount = dP;
}
Deposit (Deposit @ d)
}
amount = d.amount;
}
void display ()
{
amount = amount + 500;
cout << "Amout" << amout;
}
};
int (main C)
{
Deposit D1, D2(D1), D3(2000);
D1.display();
D2. display();
D3. display();
}
```