



EVERGREEN EDUCATIONAL TRUST

MODEL BOARD EXAMINATION

XI-Time: 3 hrs

COMPUTER SCIENCE

Total Marks: 70

Choose the best answer:

PART - I

(15x1=15)

1. Which one is the third generation computers
 - a) IBM 1401
 - b) UNICAC 1108
 - c) ENIAC
 - d) IBM 360
2. The sign bit is also called as
 - a) LSB
 - b) binary bit
 - c) Parity bit
 - d) Binary bit
3. Ram being common type needs to be refreshed frequently.
 - a) Dynamic RAM
 - b) Static RAM
 - c) RRAM
 - d) ROM
4. is a special folder to keep the files or folders deleted by the user.
 - a) my document
 - b) my computer
 - c) my network
 - d) Recycle bin
5. Which command is used to "Paste"?
 - a) Edit→Paste
 - b) View→ Paste
 - c) File→Paste
 - d) Execute → Paste
6. An expression involving variables, which remains unchanged by an assignment to one of these variables is called an.....
 - a) Variant
 - b) Invariant
 - c) loop
 - d) All the above
7. Which of the following is called as compile time operators?
 - a) size of
 - b) pointer
 - c) virtual
 - d) This
8. Identify the odd one from the keywords of jump statement
 - a) break
 - b) switch
 - c) goto
 - d) continue
9. Which is return data type of the function prototype of list (int, float);?
 - a) float
 - b) int
 - c) char
 - d) double
10. int age [] = {16, 90, 21, 35, 27, 37}; How many elements are there in this array?
 - a) 2
 - b) 5
 - c) 6
 - d) 7
11. Insulation of the data from direct access by the program is called as
 - a) Data hiding
 - b) Encapsulation
 - c) Polymorphism
 - d) Abstraction
12. The member function defined within the class behave like..... Functions.
 - a) Inline
 - b) Non inline
 - c) Outline
 - d) Data
13. Inheritance is a process of creating new class from
 - a) Base class
 - b) abstract
 - c) derived class
 - d) Function
14. Which one of the following tracks a user visits a website?
 - a) Spyware
 - b) cookies
 - c) worms
 - d) Trojans
15. TSCII Expand
 - a) Tamil Script Code for Information Interchange
 - b) Translation Script Code II
 - c) Translate Script Code for Information Interchange
 - d) Tamil Screen Code for Information Interchange

PART - II

Answer any six questions. Question No. 24 is compulsory.

(6x2=12)

16. Distinguish Primary and Secondary Memory.
17. Convert into $(87)_{10}$ into binary numbers.
18. What is multi-processing?
19. How will you rename a file?
20. What is meant by a token? Name the token available in C++.
21. Correct the following code segment.


```
If (x = 1)
P = 100;
else
P = 10;
```
22. What are importance of void data type?
23. list the search engines supported by Tamil language.
24. Define Structure. What is its use?

PART - III

Answer any Six questions. Question No. 33 is a compulsory:

(6x3=18)

25. Write the truth table of fundamental gates.
26. Write down the classification of microprocessor based on the instruction set.
27. How is state represented in algorithms?
28. 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?
29. What is the use of a header file?
30. What is the difference between supper() and toupper ()
31. List some of the features of modular programming.
32. What are the rules for function overloading?
33. Write a C++ programs to print multiplication label of a given number.

PART - IV

Answer all the questions:

(5x5=25)

34. (a) Explain the various generations of computers. (OR)
(b) Explain the process management algorithm in operating system.
35. (a) Explain the various versions of Windows OS. (OR)
(b) Trace the step-by-step execution of the algorithm for factorial (4).
factorial (n)
--inputs: n is an integers, $n \geq 0$
-- outputs: $f = n!$
f, i: 1, 1
while $I \leq n$
f, i : - $f * i$, $i+1$
36. (a) Write about Binary operations used in C++. (OR)
(b) What is an entry control loop? Explain any one of the entry - controlled loop with suitable example.
37. (a) Write a note on the basic concepts that supports oops? (OR)
(b) Explain the different types of Inheritance.
38. (a) Explain call by reference method with suitable example. (OR)
(b) Write the output of the following C++ programs.
include <iostream>
include <string.h>
using namespace std;
struct student
{
int rollno;
char name [10]
long phone number;
};
int main ()
{ student P₁ = {1, "Brown", 123443} P_x;
P₂. Rollno = 2;
Strcpy (P₂, name, "Sam");
P₂. Phone number = 1234567890;
cout <<"first student"<<endl;
cout <<"roll no"<<P₁.rollno<<endl<<"name"
<<P₁.name<<endl;
cout <<"phone no" <<P₁.phonenumber<<endl;
cout << "Second student" <<endl;
cout << "roll no" << P₂. rollno <<endl<<"name"
<<P₂.name<<endl;
cout <<"phone no:" <<P₂. Phone number<<endl;
Return 0;
}

**MOUNT CARMEL MISSION MATRIC HIGHER SECONDARY SCHOOL – KALLAKURICHI
(EVERGREEN EDUCATIONAL TRUST – MODEL BOARD EXAMINATION – 2023 – 2024)**

CLASS: XI

[ANSWER KEY]

MARK: 70

SUB: COMPUTER SCIENCE

TIME: 3 : 00 Hrs

PART – I**I. CHOOSE THE CORRECT ANSWER:****15 X 1 = 15**

- | | |
|--------------------|--|
| 1. d) IBM 360 | 11. a) Data hiding |
| 2. c) Parity bit | 12. a) Inline |
| 3. a) Dynamic RAM | 13. a) Base class |
| 4. d) Recycle bin | 14. b) cookies |
| 5. a) Edit → Paste | 15. a) Tamil Script Code for Information Interchange |
| 6. b) Invariant | |
| 7. a) size of | |
| 8. b) switch | |
| 9. b) int | |
| 10. c) 6 | |

PART – II**II. ANSWR ANY SIX QUESTIONS. QUESTION No: 24 IS COMPULSORY:****6 X 2 = 12****16. Distinguish Primary and Secondary Memory.****Ans:**

Primary Memory	Secondary Memory
Generally stores current files of OS and applications that are in use.	Generally stores data permanently.
It holds data or instructions temporarily.	It stores data permanently.
It is volatile memory.	It is non-volatile memory.
E.g: RAM (Random Access Memory).	E.g: CD, DVD, Pen Drive etc.

17. Convert into (87)₁₀ into binary numbers.**Ans:**

2		87	
2		43	– 1
2		21	– 1
2		10	– 1
2		5	– 0
2		2	– 1
		1	– 0

$$(87)_{10} = (1010111)_2$$

18. What is multi-processing?

Ans: Multi-processing 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. Each processor works on different parts of the same task or on two or more different parts of the same task or on two or more different tasks. Since the execution takes place in parallel, this features is used for high speed execution which increases the power of computing.

19. How will you rename a file?

Ans: Rename a file:

- i. Select the File to rename.
- ii. File → Rename (or) Press F2 (or) Right click → Rename.
- iii. Type in the new file name and press Enter.

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

Ans: The smallest individual unit in a program is known as a Token or a Lexical unit. C++ has the following tokens:

1. Keywords
2. Identifiers
3. Literals
4. Operators
5. Punctuators

21. Correct the following code segment.

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

Ans:

Given Code	Corrected Code
if(x = 1) P = 100; else P = 10;	if(x == 1) P = 100; else P = 10;

Note:

In this code segment, = is a wrong operator for a condition, as = is an assignment operator. In if case condition we should use == which is an equal to operator. The operator '=' checks whether the two operands are identical or not. If so, it's going to return true. Otherwise, it's going to return false. Replace = with == to make the code segment correct.

22. What are importance of void data type?

Ans: - void data type specifies an empty set of values.

- It is used as a return type for functions that do not return any value.

23. List the search engines supported by Tamil language.

Ans: Google and Bing provide searching facilities in Tamil, which means you can search everything through Tamil. A Google search engine gives you an inbuilt Tamil virtual keyboard.

24. Define Structure. What is its use?

Ans: 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.

This 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.

PART – III

III. ANSWER ANY SIX QUESTIONS. QUESTION No: 33 IS COMPULSORY:

6 X 3 = 18

25. Write the truth table of fundamental gates.

Ans: AND, OR and NOT are the fundamental gates.**Truth Table:** AND gate

Inputs		Output
A	B	$C = AB$
0	0	0
0	1	0
1	0	0
1	1	1

Truth Table: OR gate

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

Truth Table: NOT gate

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

26. Write down the classification of microprocessor based on the instruction set.

Ans: The two types of microprocessors based on their instruction sets.

i. Reduced Instruction Set Computers (RISC)

Examples: Intel P6, Pentium IV, AMD K6 and K7

ii. Complex Instruction Set Computers (CISC)

Examples: Intel 386 & 486, Pentium, Pentium II and III.

27. How is state represented in algorithms?

Ans: State of a process is abstracted by a set of variables in the algorithm. The state is simply the values of the variables.**Example:** In Farmer, Goat, Grass and Wolf Problem

Initial State is represented by

farmer, goat, grass, wolf = L, L, L, L

(All the four farmer, goat, grass and wolf are on left bank of the River)

Final State is represented by

farmer, goat, grass, wolf = R, R, R, R

(All the four farmer, goat, grass and wolf are on right bank of the River)

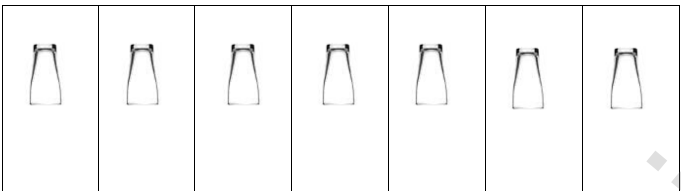
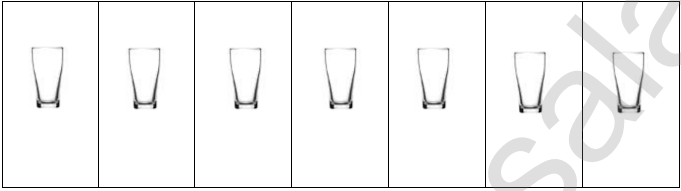
28. There are 7 tumblers on a table, all standing upside down you are allowed to turn any 2 tumblers simultaneously in one move. Is it possible to reach a situation when all the tumblers are right side up?

Ans:

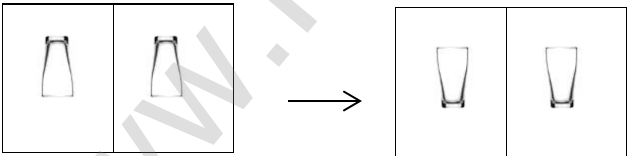
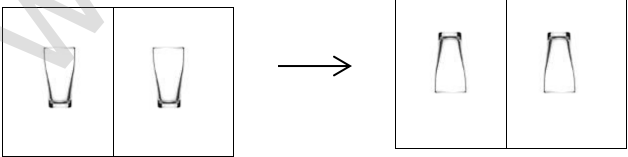
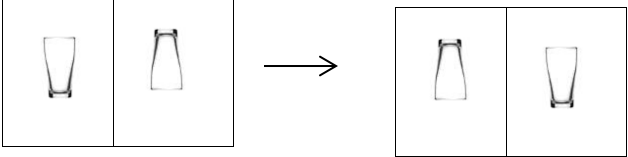
Let

$u \rightarrow$ No. of tumblers right side up()

$v \rightarrow$ No. of tumblers upside down()

State	Diagrammatic Representation	u, v	Parity of u (No. of tumblers right side up)
Initial state: All tumblers upside down		$u = 0$ $v = 7$	$u = 0 \rightarrow$ Even
Desired final state: All tumblers are right side up		$u = 7$ $v = 0$	$u = 7 \rightarrow$ Odd

Possible Iterations:

Iteration	Diagrammatic Representation	u, v	Parity of u (No. of tumblers right side up)
Case 1: Turning both upside down tumblers to right side up.		$u := u + 2$ $v := v - 2$	$u \rightarrow$ Even (Even + 2 = Even)
Case 2: Turning both right side up tumblers to upside down.		$u := u - 2$ $v := v + 2$	$u \rightarrow$ Even (Even - 2 = Even)
Case 3: Turning one right side up tumbler to upside down and other tumbler from upside down to right side up.		$u := u + 1 - 1 := u$ $v := v + 1 - 1 := v$	$u \rightarrow$ Even (Unchanged)

Observation: Initially $u = 0$, and continuous to be even in all the 3 cases. Therefore u is always even.

Invariant: u is always even (i.e. No. of right side up tumblers are always even)

Conclusion: It is not possible to reach a situation where all the tumblers are right side up ($u = 7 \rightarrow$ odd).

29. What is the use of a header file?

Ans: To use the member objects of a header file, we have to include the header file in the program.

For Example: `cin` and `cout` are the member function of the header file `<iostream.h>`. So, to use `cout` and `cin` in a program, we must include the header file `<iostream.h>`.

The statement `#include <iostream.h>` will include the header file `<iostream.h>`.

Examples of header files: `<iostream.h>`, `<conio.h>`, `<string.h>` etc

30. What is the difference between `isupper()` and `toupper()`?

Ans:

<code>isupper()</code>	<code>toupper()</code>
<code>isupper()</code> function is used to check whether the given character is Uppercase or not.	<code>toupper()</code> function is used to convert the given character to tis Uppercase.
<code>isupper()</code> returns either true or False (1 or 0).	<code>toupper()</code> returns a character.
Example: <code>char x = 'a';</code> <code>cout<<isupper(x);</code> Output: 0	Example: <code>char x = 'a';</code> <code>cout<<toupper(x);</code> Output: A

31. List some of the features of modular programming?

Ans: - 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.

32. What are the rules for function overloading?

Ans: - 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.

33. Write a C++ programs to print multiplication table of a given number.

Ans: `#include<iostream>`

`using namespace std;`

`int main()`

`{`

`int num;`

`cout<<"\n Enter Number To find its Multiplication table:";`

`cin>>num;`

`for(int a = 1; a<= ; a++)`

`{`

```

cout<<num<<" * "<<a<<" = "<<num * a<<endl;
}
return 0;
}

```

PART – IV

IV. ASWER ALL THE QUESTIONS:

5 X 5 = 25

34. a) Explain the various generations of computers.

Ans:

S.no	Generation	Period	Main Component used	Merits / Demerits
1	First Generation	1940 – 1956	Vacuum tubes	<ul style="list-style-type: none"> - Big in size - Consumed more power - Malfunction due to over heat - Machine language was used
First Generation Computers – ENIAC, EDVAC, UNIVAC I ENIAC weighed about 27 tons, size 8 feet x 100 feet x 3 feet and consumed around 150 watts of power.				
2	Second Generation	1956 – 1964	Transistors	<ul style="list-style-type: none"> - Smaller compared to First Generation - Generated less heat - Consumed less power compared to first generation - Punched cards were used - First operating system was developed – Batch processing and Multiprogramming Operating System - Machine language as well as Assembly language was used.
Second Generation Computers IBM 1401, IBM 1620, UNIVAC 1108				
3	Third Generation	1964 – 1971	Integrated Circuits (IC)	<ul style="list-style-type: none"> - Computers were smaller, faster and more reliable - Consumed less power - High Level Languages were used
Third Generation Computers IBM 360 series, Honeywell 6000 series				
4	Fourth Generation	1971 – 1980	Microprocessor Very Large Scale Integrated Circuits (VLSI)	<ul style="list-style-type: none"> - Smaller and Faster - Microcomputer series such as IBM and APPLE were developed - Portable Computers were introduced
5	Fifth Generation	1980 – till date	Ultra Large Scale Integration (ULSI)	<ul style="list-style-type: none"> - Parallel processing - Super conductors - Computers size was

				drastically reduced. - Can recognize Images and Graphics - Introduction of Artificial Intelligence and Expert systems - Able to solve high complex problems including decision making and logical reasoning
6	Sixth Generation	In future	Artificial Intelligence	- Parallel and Distributed computing - Computers have become smarter, faster and smaller - Development of robotics - Natural Language Processing - Development of Voice Recognition Software

[OR]

b) Explain the process management algorithms in Operating System.

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

Example: a system task of sending output to a printer.

Process management algorithms:

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

- i. FIFO ii. SJF iii. Round Robin iv. Based on Priority

i. **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.

ii. **SJF (Shortest Job First) Scheduling:** This algorithm works based on the size of the job begin executed by the CPU.

Example: Suppose, Job A = 6 KB and Job B = 9 KB, then

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

iii. **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: Suppose there are 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.

iv. **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: Suppose there are two jobs,









Job A → Priority = 5






Job B → Priority = 7, then

Job B is assigned to the processor before job A.

35. a) Explain the various versions of Windows OS.

Ans:

Versions	Logo	Year	Specific features
Windows 1.x		1985	<ul style="list-style-type: none"> - Introduction of GUI in 16-bit Processor. - Mouse was introduced as an input device.
Windows 2.x		1987	<ul style="list-style-type: none"> - Support to minimize or maximize windows. - Control panel feature was introduced with various system setting and customizing options.
Windows 3.x		1992	<ul style="list-style-type: none"> - Introduced the concept of multitasking. - Supported 256 Colours which brought a more modern, colourful look to the interface.
Windows NT		1993	<ul style="list-style-type: none"> - Designed to act as servers in network.
Windows 95		1995	<ul style="list-style-type: none"> - Introduced start button, the taskbar, windows Explorer and start menu. - Introduced 32-bit processor and focused more on multitasking.
Windows 98		1998	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - It introduced automated system diagnostics and recovery tools.
Windows 2000		2000	<ul style="list-style-type: none"> - 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

Versions	Logo	Year	Specific features
Windows XP		2001	<ul style="list-style-type: none"> - Introduced 64-bit processor. - Improved Windows appearance with themes and offered a stable version.
Windows Vista		2006	<ul style="list-style-type: none"> - Updated the look and feel of Windows.
Windows 7		2009	<ul style="list-style-type: none"> - Booting time was improved, introduced new user interfaces like Aero peek, pinning programs to taskbar, hand writing, recognition, etc., and Internet Explorer 8.
Windows 8		2012	<ul style="list-style-type: none"> - Windows 8 is faster than previous versions of Windows. - Start button was removed. - Windows 8 takes better advantages 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	<ul style="list-style-type: none"> - Start button was added again. - Multiple desktop. - Central Notification: Center- for App notification and quick actions. - Cortana voice activated personal assistant.

[OR]

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

factorial (n)

- - inputs: n is an integers, $n \geq 0$ - - outputs: $f = n!$

f, i: 1, 1

while $i \leq n$

f, i : = f * i, i + 1

Ans:

(i)	f = 1	i = 1	f = f * i	i = i + 1
			f = 1 x 1 = 1	i = 2
(ii)			f = 1 x 2	i = 3
			= 2	
(iii)			f = 2 x 3	i = 4
			= 6	
(iv)			f = 6 x 4	i = 5 (loop terminates)
			= 24	

36. a) Write about Binary operations used in C++.

Ans:

- Binary operators require two operands.
- Binary operators are grouped as
 - i. Arithmetic operators
 - ii. Relational operators
 - iii. Logical operator
 - iv. Assignment operator
 - v. Conditional operator (Ternary operator)

- i. **Arithmetic Operators:** - Arithmetic operators perform simple arithmetic operations like addition, subtraction, multiplication, division etc.
- Arithmetic operators are binary operators which requires minimum of two operands.

Example:

Operator	Operation	Example
+	Addition	$12 + 4 = 16$
-	Subtraction	$12 - 4 = 8$
*	Multiplication	$12 * 4 = 48$
/	Division	$12 / 4 = 3$
%	Modulus (Gives out remainder of division)	$12 \% 2 = 0$

ii. **Relational Operators:** - Relational operators are used to determine the relationship between its operands. When the relational operators are applied on two operands, the result will be a Boolean value i.e., 1 or 0 to represents True or False respectively. C++ provides 6 relational operators.

Example:

Operator	Operation	Example
<	Less than	12 < 4 is FALSE
<=	Less than or equal to	12 <= 12 is TRUE
>	Greater than	12 > 4 is TRUE
>=	Greater than or equal to	12 >= 12 is TRUE
==	Equal to	12 == 4 is FALSE
!=	Not equal to	12 != 4 is TRUE

iii. **Logical operators:** A logical operator is used to evaluate logical and relational expressions. The logical act upon the operands that are themselves called as logical expressions. C++ provides 3 logical operators.

Example:

Operator	Operation	Description	Example
&&	AND	The logical AND combines two different relational expressions into one. Both expressions are TRUE returns TRUE, otherwise returns FALSE	(80 > 35) && (70 > 35) will return TRUE
	OR	The logical OR combines two different relational expressions in to one. Any one expressions is TRUE returns TRUE otherwise returns FALSE.	(80 > 35) (70 > 35) will return TRUE
!	NOT	NOT works on a single expression / operand. Expression is TRUE returns FALSE. Expression is FALSE returns TRUE	!(80 > 35) will return FALSE

iv. **Assignment Operator:** Assignment operator is used to assign a value to a variable which is on the left hand side of an assignment statement. = (equal to) is commonly used as the assignment operator in all computer programming languages. This operator copies the value at the right side of the operator to the left side variable. It is also a binary operator.

Example:

Operator	Name of the Operator	Example
=	Assignment	a = 5; b = a + 2; // b will be 7
+=	Addition assignment	a = 5; a += 2; // a will be 7
-=	Subtraction assignment	a = 5; a -= 2; // a will be 3
*=	Multiplication assignment	a = 5; a *= 2; // a will be 10

/ =	Division assignment	a = 6; a / = 2; // a will be 3
% =	Modulus assignment	a = 5; a % = 2; // a will be 1

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

Example:

Operator	Name of the Operator	Example
? :	Conditional operator	largest = (a > b)? a : b;

[OR]

b) **What is an entry control loop? Explain any one of the entry – controlled loop with suitable example.**

Ans: In an entry control loop, the test-expression is evaluated before the entering into a loop.

Example: 1. while loop 2. for loop

1. **while loop:**

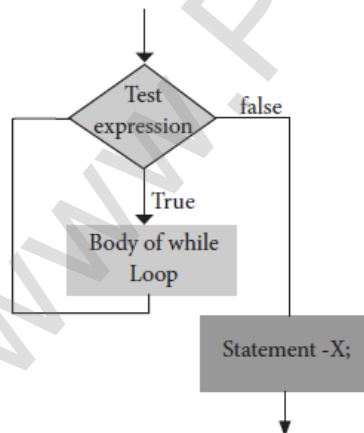
Purpose: A while loop is a control flow statement that allows the loop statements to be executed as long as the condition is true.

Type: Entry control loop

Syntax:

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

Flowchart representation:



Workflow:

Step 1: Test-expression is evaluated to either True or False.

Step 2: If test-expression is True

- a) The body of the loop is executed
- b) Control is transferred to step1.

Step 3: If test-expression is False, the control exits the while loop.

Example:

```
#include<iostream>
using namespace std;
void main( )
{
int a = 2;
while (a <= 10)
{
cout<<a<<"\t";
a+=2;
}
```

OUTPUT:

2 4 6 8 10

37. a) Write a note on the basic concepts that supports OOPS?

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


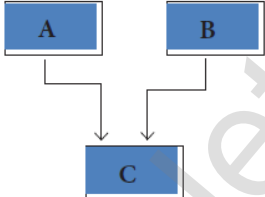
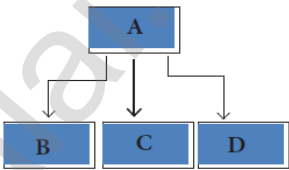
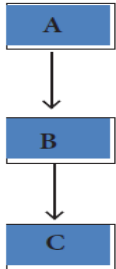
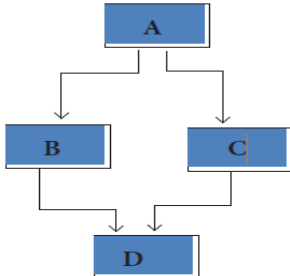
[OR]

b) Explain the difference types of Inheritance.

Ans: Inheritance is the process of creating new classes called derived classes, from the existing or base classes.

There are different types of inheritance, namely

- i) Single inheritance
- ii) Multiple inheritance
- iii) Multilevel inheritance
- iv) Hybrid inheritance
- v) Hierarchical inheritance

<p>i. Single Inheritance: When a derived class inherits only from one base class, it is known as single inheritance</p>	 <p style="text-align: center;">Single Inheritance</p>
<p>ii. Multiple Inheritance: When a derived class inherits from multiple base classes it is known as multiple inheritance</p>	 <p style="text-align: center;">Multiple Inheritance</p>
<p>iii. Hierarchical Inheritance: When more than one derived classes are created from a single base class, it is known as Hierarchical inheritance</p>	 <p style="text-align: center;">Hierarchical Inheritance</p>
<p>iv. 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</p>	 <p style="text-align: center;">Multilevel Inheritance</p>
<p>v. 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</p>	 <p style="text-align: center;">Hybrid Inheritance</p>

38. a) Explain call by reference method with suitable example.

Ans: Call by reference:

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.

Example:

```
#include<iostream>
using namespace std;
void display(int &x) //passing address of a//
{
    x=x*x;
    cout<<"\n\nThe Value inside display function (n1 x n1) :"<<x ;
}
int main()
{
    int n1;
    cout<<"\nEnter the Value for N1 :";
    cin>>n1;
    cout<<"\nThe Value of N1 is inside main function Before passing : "<< n1;
    display(n1);
    cout<<"\nThe Value of N1 is inside main function After passing (n1 x n1) : "<< n1; return(0);
}
```

Output :

Enter the Value for N1 :45

The Value of N1 is inside main function Before passing : 45

The Value inside display function (n1 x n1) :2025

The Value of N1 is inside main function After passing (n1 x n1) : 2025

b) Write the output of the following C++ program:

```
#include<iostream>
#include<string.h>
using namespace std;
struct student
{
    int rollno;
    char name[10];
    long phone_number;
};
int main()
{
    student p1 = {1, "Brown", 123443}, p2;
    p2.rollno=2;
    strcpy(p2, name, "Sam");
    p2.phone_number = 1234567890;
```

```
cout<<"First Student"<<endl;
cout<<"rollno:"<<p1.rollno<<endl<<"name"<<p1.name<<endl;
cout<<"phone no:"<<p1.phone_number<<endl;
cout<<"Second Student"<<endl;
cout<<"rollno"<<p2.rollno<<endl<<"name"<<p2.name<<endl;
cout<<"phone no:"<<p2.phone_number<<endl;
return 0;
}
```

Ans:

OUTPUT:

```
First Student
rollno: 1
name: Brown
phone no: 123443
Second Student
rollno: 2
name: Sam
phone no: 1234567890
```

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