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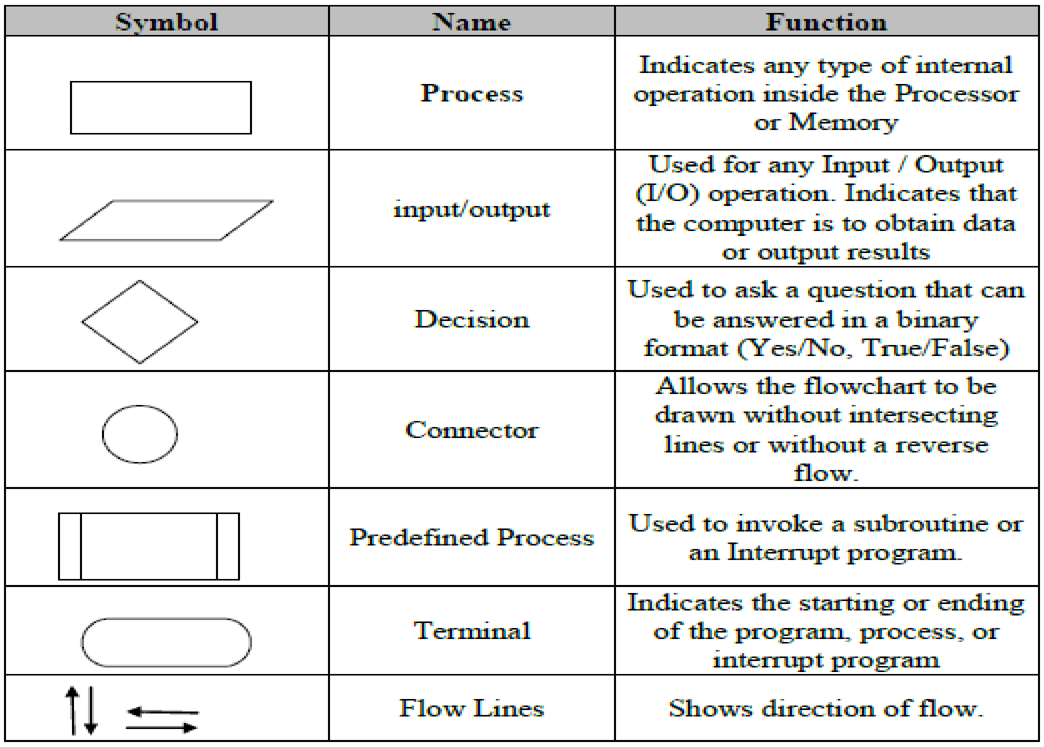
Winter 19
2 marks

- **Define array. List its type.**

Array is a fixed-size sequential collection of elements of the same type.
Types:
1. One dimensional
2. Multi dimensional

- **Draw & label different symbols used in flowcharts.**



Symbol	Name	Function
	Process	Indicates any type of internal operation inside the Processor or Memory
	input/output	Used for any Input / Output (I/O) operation. Indicates that the computer is to obtain data or output results
	Decision	Used to ask a question that can be answered in a binary format (Yes/No, True/False)
	Connector	Allows the flowchart to be drawn without intersecting lines or without a reverse flow.
	Predefined Process	Used to invoke a subroutine or an Interrupt program.
	Terminal	Indicates the starting or ending of the program, process, or interrupt program
	Flow Lines	Shows direction of flow.

-

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- **Find the output of the following program:**

```
#include
void main( )
{
int x = 10, y = 10, v1, v2;
v1 = x++;
v2 = ++y;
printf("value of v1: %d, v1);
printf("value of v2: %d, v2);
}
```

Output:

```
value of v1:10value of v2:11
```

- **State the syntax & use of strlen ( ) & strcat ( ) function.**

strlen( ): calculates the length of the string
Syntax:
strlen(s1);

strcat():concatenates two strings
Syntax:
strcat(s1,s2)

- **State the Relational operators with example.**

== - returns true if the values of two operands are equal else returns false.
E.g: if (A= = B){ }
!= - returns true if values of two operands are not equal, else returns false
E.g: if (A! = B){ }
<- returns true if the first operand is less than the second, else returns false.
E.g: if (A< B){ }
>- returns true if the first operand is greater than the second, else returns false.
E.g: if (A> B){ }
<= returns true if the first operand is less than or equal to the second, else returns false.
E.g: if (A< = B){ }
>= returns true if the first operand is greater than or equal to the second, else returns false.

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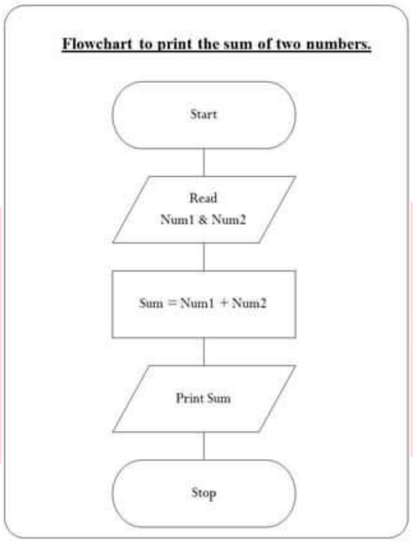
E.g: if (A> = B){ }

- **State the syntax to declare pointer variable with example.**

General syntax to declare pointer.
datatype *var_name;
Eg: int var = 20;

- **Draw flow chart for addition of two numbers.**



- **State the importance of flow chart.**

A flowchart is a type of diagram that represents an algorithm. It is a visual representation of a sequence of steps to complete the process. A flow chart describes a process using symbols rather than words. Computer programmers use flow charts to show where data enters the program, what processes the data goes through, and how the data is converted to output.

-can be used to quickly communicate the ideas or plans that one programmer envisions to other people who will be involved in the process.
- aid in the analysis of the process to make sure nothing is left out and that all possible inputs, processes, and outputs have been accounted for.

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-help programmers develop the most efficient coding because they can clearly see where the data is going to end up.
- help programmers figure out where a potential problem area is and helps them with debugging or cleaning up code that is not working.
- are a useful tool in visualizing a module's flow of execution before writing any code. This allows developers to do three things:
  (i) verify the algorithm's correctness before writing code
  (ii) visualize how the code will ultimately be written
  (iii) and communicate and document the algorithm with other developers and even non-developers.

-may be used in conjunction with other tools, such as pseudo-code, or may be used by itself to communicate a module's ultimate design, depending on the level of detail of the flowchart.

- **Write a program to declare structure student having rollno, name & marks. (Note: Any other correct logic shall be considered). Accept and display data for three students.**

```
clrscr();
for(i=0;i<3;i++) {
printf("Enter rollno, name and marks\n");
scanf("%d%s%d",&s[i].rollno,&s[i].name,&s[i].marks);
}
for(i = 0; i<3;i++){
printf("\nThe details of student %d\n",i+1);
printf("Roll no %d\n",s[i].rollno);
printf("Name is %s\n",s[i].name);
printf("Marks %d\n",s[i].marks);
}
getch();
}
```

- **Explain pointer arithmetic with example. (Note: Code snippet shall be considered).**

The pointer arithmetic is done as per the data type of the pointer.
The basic operations on pointers are:
Increment It is used to increment the pointer. Each time a pointer is incremented, it points to the next location.
Eg, for an int pointer variable, if the current position of pointer is 1000, when incremented it points to 1002 because for storing an int value it takes 2 bytes of memory. Decrement It is used to decrement the pointer. Each time a pointer is decremented, it points to the previous location.
Eg, if the current position of pointer is 1002, then decrement operation results in the pointer pointing to the location 1000.

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Addition and subtraction:
When addition or subtraction operation is performed on the pointer variable, it shows that particular location in the memory.
Eg:
int *ptr; -say address is 1000.
If -> ptr+n- then ptr+n*2 .
If -> ptr-n thenptr-n*2.

```
#include
#include
void main()
{
int i = 10;
int *ptr=&i;
clrscr();
printf("%x%d",ptr,i);
ptr++;
printf("\n%x%d",ptr,i);
printf("\n%x",ptr+2);
printf("\n%x",ptr-2);
getch();
}
```

- **Explain nested if-else with example. (Note: Any example shall be considered)**

When a series of decision is required, nested if-else is used. Nesting means using one if-else construct within another one. If the condition in the outer if, is true, then only the inner if-else will get executed. Further the statements in the inner if will get execute only if the condition of inner if, evaluates to true. If it is false, the statements in inner else will get executed. If the outer if evaluates to false, then the statements in outer else get executed.
General syntax:

```
if(condition)
{
if(condition)
{ statements }
else
{ statements }
} else
```

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```
{ statements }
statements

Example:
#include
#include
void main()
{
int val;
clrscr();
printf("Enter a number");
scanf("%d",&val);
if(val>=5)
{
if(val>5)
{
printf("Number is greater than 5");
}
else
{
printf("Number is equal to 5");
}
}
else
{
printf("Number is less than 5");
}
getch();
}
```

- **Describe the following terms:**
  1. **Keyword**
  2. **Identifier**
  3. **Variable**
  4. **Constant**

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Keyword: Keywords are special words in C programming which have their own predefined meaning. The functions and meanings of these words cannot be altered.
Some keywords in C Programming are if, while, for, do, etc..
Identifier: Identifiers are user-defined names of variables, functions and arrays. It comprises of combination of letters and digits.
Example
int age1;
float height_in_feet;
Here, age1 is an identifier of integer data type. Similarly height_feet is also an identifier but of floating integer data type
Variable: A variable is nothing but a name given to a storage area that our programs can manipulate. Each variable in C has a specific type, which determines the size and layout of the variable's memory; the range of values that can be stored within that memory; and the set of operations that can be applied to the variable.
Example:
add, a, name
Constant: Constants refer to fixed values that the program may not change during its execution. These fixed values are also called literals. Constants can be of any of the basic data types like an integer constant, a floating constant, a character constant, or a string literal. There are enumeration constants as well.
Example:
121
234
3.14

- **Differentiate between call by value and call by reference.**

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Sr. No.	Call by value	Call by reference
1	When function is called by passing values then it is call by value	When function is called by passing address of variable then it is called as call by reference.
2	Copy of actual variable is created when function is called.	No copy is generated for actual variable rather address of actual variable is passed.
3	In call by value, memory required is more as copy of variable is created.	In call by reference, memory required is less as there is no copy of actual variables.
4	Example:- Function call - Swap (x,y); Calling swap function by passing values.	Example:- Function call – Swap (&x, &y); Calling swap function by passing address.
5	Original (actual) parameters do not change. Changes take place on the copy of variable.	Actual parameters change as function operates on value stored at the address.

- **Explain conditional operator with example.**

Conditional Operator (Ternary Operator):
It takes the form ? : to construct conditional expressions
The operator ? : works as follows:
exp1 ? exp2 : exp 3
Where exp1, exp2 and exp3 are expressions.exp1 is evaluated first, If it is true, then the expression exp2 is evaluated and becomes the value of the expression. If exp1 is false, exp3 is evaluated and its value becomes the value of the expression.
E.g.
int a=10,b=5,x;
x=(a>b) ? a : b;

- **List the categories of functions and explain any one with example.**
  Different categories of function:

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1) Function with no arguments and no return value.
2) Function with arguments and no return value.
3) Function with no arguments and return value.
4) Function with arguments and return value.

1) **Function with no arguments and no return value:**
This category of function cannot return any value back to the calling program and it does not accept any arguments also. It has to be declared as void.
For example:
```
void add()
{
inta,b,c;
a=5;
b=6;
c=a+b;
printf("%d",c);
}
```
It should be called as add();

2) **Function with arguments and no return value:**
This category of function cannot return any value back to the calling program but it takes arguments from calling program. It has to be declared as void. The number of arguments should match in sequence, number and data type.
For example:
```
void add(intx,int y)
{
int z;
z=x+y;
printf("%d",z);
}
```
It should be called as add(4,5);
where x will take 4 and y will take 5 as their values.

3) **Function with no arguments and return value:**
This category of function can return a value back to the calling program but it does not take arguments from calling program. It has to be declared with same data type as the data type of return variable.
For example:
```
int add()
```

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```
{
inta,b,c;
a=5;
b=6;
c=a+b;
return(c);
}
```

It should be called as int x = add();
where x will store value returned by the function.

4) **Function with arguments and return value:**
This category of function can return a value back to the calling program but it also takes arguments from calling program. It has to be declared with same data type as the data type of return variable.
For example:

```
int add(intx,int y)
{
int z;
z=x+y;
return(z);
}
```

It should be called as int s = add(4,5);
where x will have 4 and y will have 5 as their values and s will store value returned by the function.

- **Write an algorithm to determine the given number is odd or even.**

```
Step 1- Start
Step 2- Read / input the number.
Step 3- if n%2==0 then number is even.
Step 4- else number is odd.
Step 5- display the output.
Step 6- Stop
```

Illustrate the use of break and continue statement with example.

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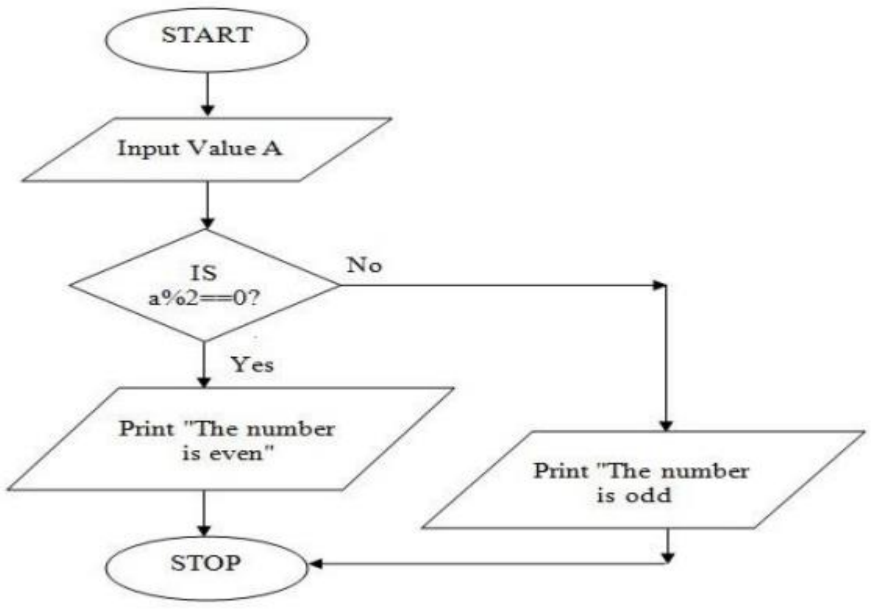
Summer 19
2 Marks

- **Draw flowchart for checking whether given number is even or odd**



- **(b) List any four keywords used in 'C' with their use.**
  (any other relevant keyword in 'C' may be considered.)

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Keyword	Use
auto	It is used to declare auto storage class variable.
break	It is used to exit from block or loop.
case	It is used to represent possible case inside switch case statement
char	Used for declaration of character type variable
const	It is used to declare a constant.
continue	It is used pass control at the beginning of the loop
default	It is used to represent default case inside switch case statement.
do	It is used to execute loop in association with while condition.
double	Used for declaration of double type variable
else	It is used with if statement to transfer control to statement when condition is false.
enum	It is used to declare enumerated data.
extern	It is used to declare extern storage class variable
float	Used for declaration of float type variable
for	Used for repetitive execution of statements
goto	It is used to transfer control from one statement to another
if	It is used for condition checking
int	Used for declaration of integer type variable
long	Used for declaration of long type variable
register	It is used to declare register storage class variable
return	It is used to return value from function.
short	Used for declaration of short type variable
signed	Used for declaration of signed type variable
sizeof	It returns memory size allocated to variable or data type
static	It is used to declare static storage class variable
struct	It is used to declare user defined data type structure

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switch	It is used to make decision from multiple number of inputs
typedef	Used to redefine the name of an existing variable type.
union	It is used to declare the data type union
unsigned	Used for declaration of unsigned type variable
void	Specify that function does not return any value
volatile	It is used to declare a volatile variable
while	Used for repetitive execution of statements

- **Write the syntax of switch case statement.**

```
switch(variable)
{
case value1:
statements
break;
case value2:
statements;
break;
. . .
default:
statements;
break;
}
```

- **State any two differences between while and do-while statement. (Note: Any 2 points shall be considered).**

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while	Do-while
In 'while' loop the controlling condition appears at the start of the loop.	In 'do-while' loop the controlling condition appears at the end of the loop.
The iterations do not occur if, the condition at the first iteration, appears false.	The iteration occurs at least once even if the condition is false at the first iteration.
It is an entry controlled loop	It is an exit controlled loop

while(condition) {
bodv
}
	do {
	bodv
	}while(condition);

- **State difference between array and string. (Note: Any two valid points shall be considered).**

Array	String
Array can be of any type like int, float, char.	String can contain only characters.
Element Elements in an array can be accessed using its position like a[2].s in an array can be accessed using its position like a[2].	Characters in string are accessed sequentially from first to last.
Array does not end with a null character	String is ended with a '\0' character.
Array size once declared cannot be changed	String size can be modified using pointer.

- **Declare a structure student with element roll-no and name.**

```
struct student
{
int roll_no;
char name[20];
};
```

- **Distinguish between call by value and call by reference. (Note: Any two points shall be considered).**

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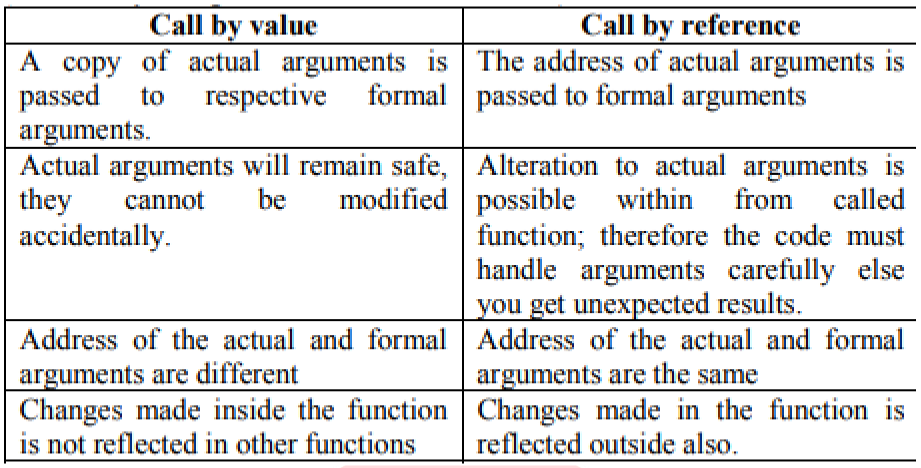

Call by value	Call by reference
A copy of actual arguments is passed to respective formal arguments.	The address of actual arguments is passed to formal arguments
Actual arguments will remain safe, they cannot be modified accidentally.	Alteration to actual arguments is possible within from called function; therefore the code must handle arguments carefully else you get unexpected results.
Address of the actual and formal arguments are different	Address of the actual and formal arguments are the same
Changes made inside the function is not reflected in other functions	Changes made in the function is reflected outside also.

Winter 18
2 Marks

- **Define Algorithm**

Algorithm:- Algorithm is a stepwise set of instructions written to perform a specific task.

- **Give the significance of and header files.**

“math.h” header file supports all the mathematical related functions in C language.
stdio.h header file is used for input/output functions like scanf and printf

- **Give syntax of if-else ladder.**

```
if(condition_expression_One)
{
statement1;
}
else if (condition_expression_Two)
{
statement2;
}
```

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```
else if (condition_expression_Three)
{
statement3;
}
else
{
statement4;
}
```

- **Define Array.**

An array is a collection of data items, all of the same type, accessed using a common name. A one-dimensional array consists of similar type of multiple values in it. A two dimensional array consists of row and column

- **Write syntax and use of pow ()function of header file**

pow()- compute the power of a input value
Syntax:
double pow (double x, double y);

- **Define pointer. Write syntax for pointer declaration.**

Definition:
A pointer is a variable that stores memory address of another variable which is of similar data type.
Declaration:
datatype *pointer_variable_name;

- **Draw and label symbols used in flow chart.**

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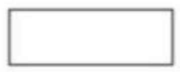
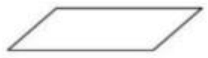
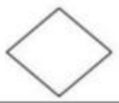
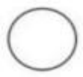
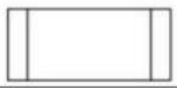
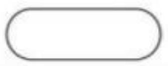
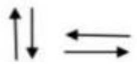
Symbol	Name	Function
	**Process**	Indicates any type of internal operation inside the Processor or Memory
	input/output	Used for any Input / Output (I/O) operation. Indicates that the computer is to obtain data or output results
	Decision	Used to ask a question that can be answered in a binary format (Yes/No, True/False)
	Connector	Allows the flowchart to be drawn without intersecting lines or without a reverse flow.
	Predefined Process	Used to invoke a subroutine or an Interrupt program.
	Terminal	Indicates the starting or ending of the program, process, or interrupt program
	Flow Lines	Shows direction of flow.

Summer 18
2 Marks

- **Define:**
  (i) Two dimensional array
  (ii) (ii) Multi-dimensional array

  - Two dimensional array Two dimensional array is a collection of similar type of data elements arranged in the form of rows & columns.
    E.g. Array can be declared as int arr[3][3]; In this there can be 9 elements in an array with 3 rows and 3 columns.

  - Multi-dimensional array: An array with more than one dimension is called as multidimensional array.

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For example, float x[3][4]; Similarly, you can declare a three-dimensional (3d) array. For example, float y[2][4][3];

- **Give any four advantages of pointer.**

Advantages of pointer:
1. Pointers reduce the length and complexity of a program.
2. They increase execution speed.
3. A pointer enables us to access a variable that is defined outside the function.
4. Pointers are more efficient in handling the data tables.
5. The use of a pointer array of character strings results in saving of data storage space in memory.
6. It supports dynamic memory management.

- **Define type casting. Give any one example.**

Definition type casting: The conversion of one data type to another is known as type casting. The values are changed for the respective calculation only, not for any permanent effect in a program.
For example, x=int (7.5) means 7.5 is converted to integer by truncating it i.e. 7 b=(int) 22.7/(int) 5.3 means 22.7 will be converted to 22 and 5.3 to 5 so answer will be 22/5=4 c=(double) total/num means the answer will be in float value. p=sin((int)x) means x will be converted to integer and then sine angle will be calculated.

- **State any four decision making statement.**

Decision making statement:
1. if statement
2. if-else statement
3. if-else-if ladder
4. Nested if-else statement
5. switch statement
6. conditional operator statement (? : operator)

- **State any four math functions with its use. (Note: Any other relevant math function shall be considered)**

Math Functions:
sqrt() - square root of an integer
abs() - absolute value of an integer
sin() - compute the sine value of an input value

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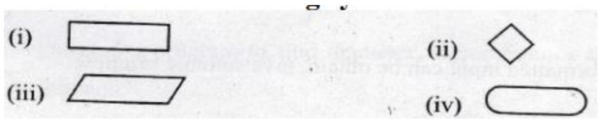
cos()- compute the cosine value of an input value
pow()- compute the power of a input value
floor()- round down the input value
ceil()- round up the input value

- **State the use of following symbols used for flowchart drawing:**



(i)	General processing
(ii)	Decision making
(iii)	Input/ Output statements
(iv)	Start / Stop

- **State use of while loop with syntax.**

While loop is used in programming to repeat a specific block of statement until some end condition is met.
The syntax of a while loop is:

```
while (test Expression)
{
Statements… statements….
}
```

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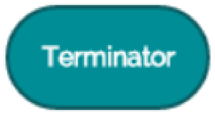
Summer 22

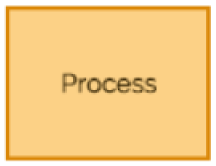
a) Draw and label different symbols used in flowchart.

1. The Oval
An End or Beginning While Creating a Flowchart



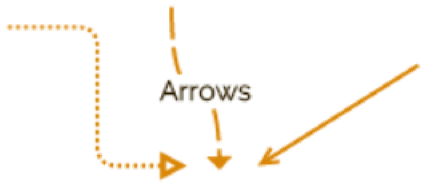
The oval, or terminator, is used to represent the start and end of a process. Remember to use the same symbol again to show that your flowchart is complete.

2. The Rectangle
A Step in the Flowcharting Process



The rectangle is your go-to symbol once you've started flowcharting. It represents any step in the process you're diagramming and is the workhorse of the flowchart diagram. Use rectangles to capture process steps like basic tasks or actions in your process.

3. The Arrow
Indicate Directional Flow



The arrow is used to guide the viewer along their flowcharting path. And while there are many different types of arrow tips to choose from, we recommend sticking with one or two for your entire flowchart. This keeps your diagram looking clean, but also allows you to emphasize certain steps in your process.

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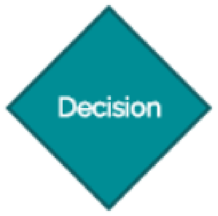
4. The Diamond
Indicate a Decision



The diamond symbolizes that a decision is required to move forward. This could be a binary, this-or-that choice or a more complex decision with multiple choices. Make sure that you capture each possible choice within your diagram.

b) List any four keywords used in 'C'

In the C programming language, keywords are reserved words that have special meanings and cannot be used as identifiers (names for variables, functions, etc.). Here are four keywords in C:

1)int: Used for declaring integer variables.
2)float: Used for declaring floating-point variables.
3)if: Used to conditionally execute a block of code.
4)for: Used to create a loop that repeats a block of code a specified number of times.
These keywords play fundamental roles in the structure and logic of C programs. There are several other keywords in C, each serving a specific purpose in the language.

c) State any four decision making statements.
In the C programming language, decision-making statements are used to control the flow of the program based on certain conditions. Here are four decision-making statements in C:

1)if statement: The if statement is used to execute a block of code if a specified condition is true.
2)if-else statement: The if-else statement is used to execute one block of code if the condition is true and another block if the condition is false.
3)else if statement: The else if statement is used to test multiple conditions sequentially. It allows checking for multiple conditions and executing the corresponding block of code for the first true condition.
4)switch statement: The switch statement is used to select one of many blocks of code to be executed. It provides an alternative to a sequence of if-else if-else statements.

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These decision-making statements provide flexibility in controlling the flow of a C program based on different conditions.

d) Define array. List its types.

Definition of Array:

An array in programming is a collection of elements of the same data type that are stored in contiguous memory locations. Each element in an array is identified by an index or a key. Arrays provide a way to store multiple values under a single variable name, making it easier to manage and manipulate data.

Types of Arrays:

1)One-dimensional array:

An array that stores elements in a linear sequence. Each element has a unique index, and accessing elements involves using a single subscript or index.

2)Two-dimensional array:

An array of arrays, where each element is identified by two indices (row and column). It represents a table of values with rows and columns.

3)Multi-dimensional array:

Arrays with more than two dimensions. While less common, they can have three or more indices to represent data structures with higher dimensions.

4)Character array (String):

An array of characters, often used to represent strings in programming. In C, strings are essentially arrays of characters ending with a null character ('\0').

5)Dynamic array:

An array whose size can be dynamically adjusted during runtime. In languages like C++, dynamic arrays are implemented using data structures like vectors.
These are some common types of arrays. Each type serves a specific purpose, and the choice of array type depends on the requirements of the program.

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e) Write syntax and use of POW ( ) function or header file.
In C, the pow() function is used for power or exponentiation. To use this function, you need to include the <math.h> header file.

Syntax:

```
#include <math.h>

double pow(double base, double exponent);
```

e) State the syntax to declare a pointer variable with example.
Syntax: data_type *pointer_name;
For example,
int *ptr;

f) Draw flowchart for addition of two numbers.
1)Start
2)Input number1
3)Input number2
4)Sum = number1 + number2
5)Output sum
6)End

Winter-22
2 Marks

a) Define the terms :
i) Flow chart
ii) Algorithm

ANS: i) Flowchart:

A flowchart is a visual representation of a process or algorithm. It uses various symbols and shapes to represent different steps, decisions, and the flow of control within a program or system. Flowcharts help in understanding and designing algorithms.
ii) Algorithm:

An algorithm is a step-by-step set of instructions or a clear, unambiguous sequence of computational steps that are to be followed to solve a problem. It is a systematic approach to problem-solving and forms the basis for writing computer programs.

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b) State any four data types used in 'C'.

1)int: Used for integer data types.
2)float: Used for floating-point data types.
3)char: Used for character data types.
4)double: Used for double-precision floating-point data types.

c) List logical operators in 'C'.

Logical operators in C include:

1)&& (Logical AND): Returns true if both operands are true.
2)|| (Logical OR): Returns true if at least one operand is true.
3)! (Logical NOT): Returns true if the operand is false, and false if the operand is true.

d) Define structure. Give one example of structure declaration.

In C, a structure is a user-defined data type that allows combining different data types under a single name. It is used to group related data items.
Example:

```
struct Point {
   int x;
   int y;
};
```

This defines a structure named Point that contains two members: x and y, both of type int.
e) State any two advantages of function.

Two advantages of using functions in programming are:

1)Modularity: Functions allow breaking down a program into smaller, manageable, and reusable pieces. This promotes modularity, making the code easier to understand, maintain, and debug.
2)Code Reusability: Functions can be reused in different parts of a program or even in different programs. Once a function is defined, it can be called multiple times, reducing code duplication and promoting efficiency.

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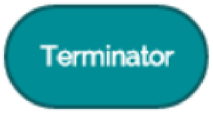
f) Write the meaning of '&' and * with respect to pointer.

1)& (Address-of Operator): It returns the memory address of a variable.
2)* (Dereference Operator): It is used to access the value stored at the address held by a pointer.

g)Draw any two symbols used to construct flow chart. Also state their use

1. The Oval
An End or Beginning While Creating a Flowchart



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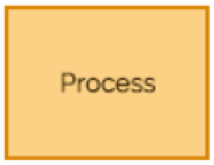
2. The Rectangle
A Step in the Flowcharting Process



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Summer-19
4 Marks

- **State four arithmetic operations perform on pointer with example. (Note: Code snippet shall be considered)**

The pointer arithmetic is done a
s per the data type of the pointer. The basic operations on pointers are **Increment:** It is used to increment the pointer. Each time a pointer is incremented, it points to the next location with respect to memory size .
Example, If ptr is an integer pointer stored at address 1000,then ptr++ shows 1002 as incremented location for an int.It increments by two locations as it requires two bytes storage.
Decrement: It is used to decrement the pointer. Each time a pointer is decremented, it points to the previous location with respect to memory size.
Example, If the current position of pointer is 1002, then decrement operation ptr-- results in the pointer pointing to the location 1000 in case of integer pointer as it require two bytes storage.
Addition
When addition operation is performed on pointer, it gives the location incremented by the added value according to data type.
Eg: If ptr is an integer pointer stored at address 1000, Then ptr+2 shows 1000+(2*2) = 1004 as incremented location for an int.
Subtraction
When subtraction operation is performed on the pointer variable, it gives the location decremented by the subtracted value according to data type.
Eg: If ptr is an integer pointer stored at address 1004, Then ptr-2 shows 1004-(2*2) = 1000 as decremented location for an int

- **Draw flowchart for checking weather given number is prime or not.**

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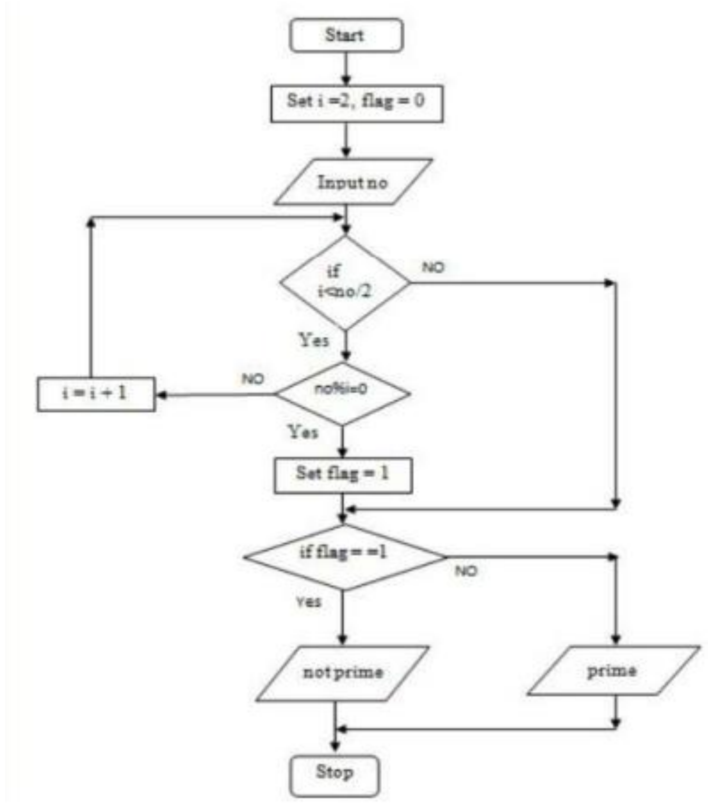

- **Write a program to reverse the number 1234 (i.e. 4321) using function. (Note: Any other correct logic shall be considered).**

```
#include
#include
void findReverse();
void main()
{
findReverse();
}
void findReverse()
{
int num, res=0,ans=0;
clrscr();
```

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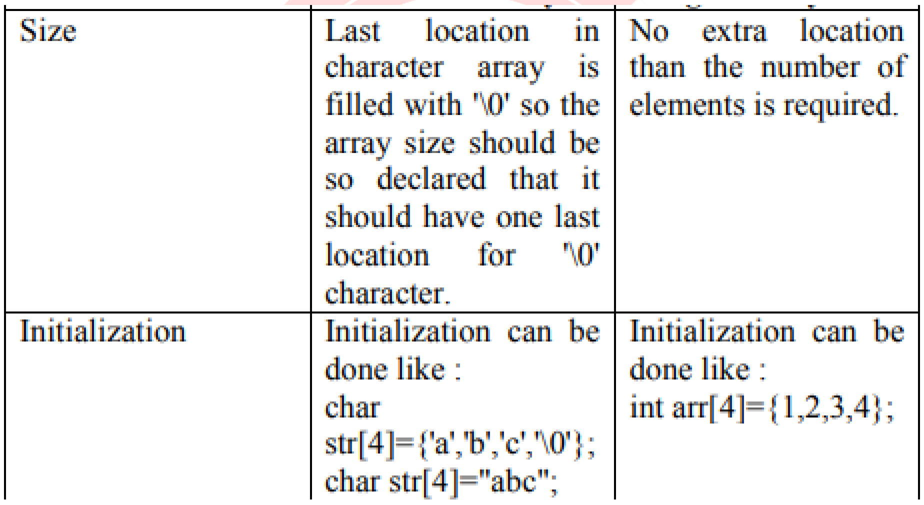
```
printf("Enter the number");
scanf("%d", &num);
while(num!=0)
{
res=num%10;
ans=ans*10+res;
num=num/10;
}
printf("Reverse number is %d", ans);
getch();
}
```

- **Differentiate between character array and integer array with respect to size and initialisation.**



Size	Last location in character array is filled with '\0' so the array size should be so declared that it should have one last location for '\0' character.	No extra location than the number of elements is required.
Initialization	Initialization can be done like : char str[4]={'a','b','c','\0'}; char str[4]="abc";	Initialization can be done like : int arr[4]={1,2,3,4};

- **Explain any four bit-wise operator used in 'C' with example.**

Bitwise operators:
Bitwise OR-|
It takes 2 bit patterns and performs OR operations on each pair of corresponding bits. The following example will explain it.
1010
1100

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OR
1110

Bitwise AND- &
It takes 2 bit patterns and performs AND operations with it.
1010
1100
AND 1000
The Bitwise AND will take pair of bits from each position, and if only both the bit is 1, the result on that position will be 1. Bitwise AND is used to Turn-Off bits.

Bitwise NOT
One's complement operator (Bitwise NOT) is used to convert each "1-bit to 0-bit" and "0-bit tol-bit", in the given binary pattern. It is a unary operator i.e. it takes only one operand.
1001
NOT
0110

Bitwise XOR ^
Bitwise XOR ^, takes 2 bit patterns and perform XOR operation with it.
0101
0110

XOR 0011

Left shift Operator - <<
The left shift operator will shift the bits towards left for the given number of times.
int a=2<<1;

Right shift Operator - >>
The right shift operator will shift the bits towards right for the given number of times.
int a=8>>1;

- **With suitable example, explain how two dimensional arrays can be created.**

The array which is used to represent and store data in a tabular form is called as two dimensional array. Such type of array is specially used to represent data in a matrix form.
Declaration of two dimensional arrays:

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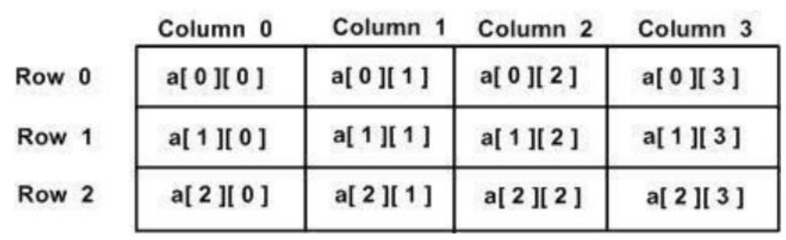
Syntax:-
Data type arrayname [row size] [column size];
Eg:
int arr[3][4];
This will declare “arr”with 3 rows and 4 columns. A two-dimensional array can be considered as a table which will have x number of rows and y number of columns. A two-dimensional array a, which contains three rows and four columns can be shown as follows-



	Column 0	Column 1	Column 2	Column 3
Row 0	a[0][0]	a[0][1]	a[0][2]	a[0][3]
Row 1	a[1][0]	a[1][1]	a[1][2]	a[1][3]
Row 2	a[2][0]	a[2][1]	a[2][2]	a[2][3]

Thus, every element in the array a is identified by an element name of the form a[i][j], where 'a' is the name of the array, and 'i' and 'j' are the subscripts that uniquely identify each element in 'a'.

Example :
```
main()
{
int a[2][2]={{1,2},{4,5}};
int i,j;
for(i=0;i
printf( "%d",a[i][j]);
}
printf("\n");
}
}
```

- **Explain any two string functions with example.**

Strlen function:
strlen( ) function in C gives the length of the given string. strlen( ) function counts the number of characters in a given string and returns the integer value. It stops counting the character when null character is found. Because, null character indicates the end of the string in C.
Syntax: strlen(stringname);
Example:
Consider str1="abc"

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strlen(str1); returns length of strl as 3

strcat() function:
In C programming, strcat() concatenates (joins) two strings. It concatenates source string at the end of destination string.
Syntax:
strcat(destinationsource, source string);
Example:
Consider str1="abc" and str2="def" strcat(str1,str2); returns abcdef in str1 and str2 remains unchanged.

strcpy() function
strncpy() function copies portion of contents of one string into another string.
Syntax:
strncpy(destination string, source string, size);
Example:
Consider str1="abc" strcpy(str1,str2); returns abcstr2

strcmp() function
The stremp function compares two strings which are passed as arguments to it. If the strings are equal then function returns value 0 and if they are not equal the function returns some numeric value.
Syntax:
strcmp(str1, str2);
Example:
Consider str1="abc" and str2="abc"
Then strcmp(str1,str2) returns 0 as both the strings are same.

- **Draw flowchart for finding largest number among three number**

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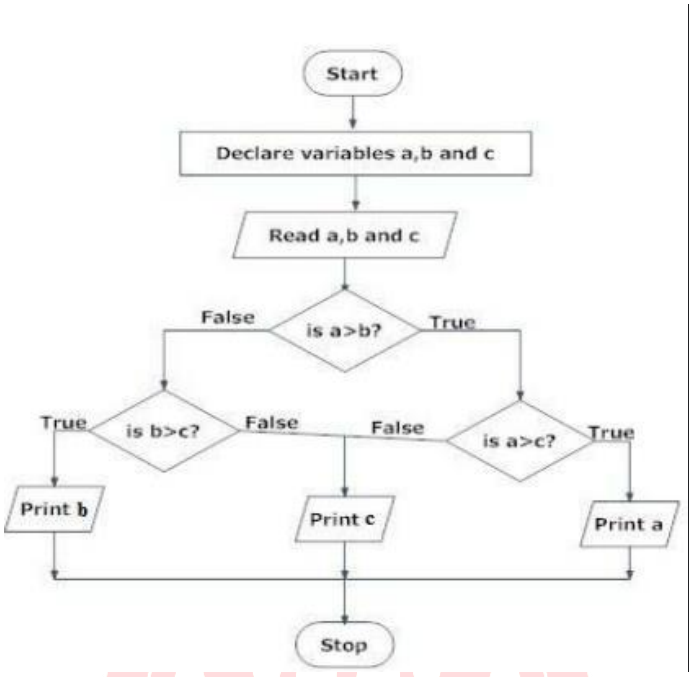
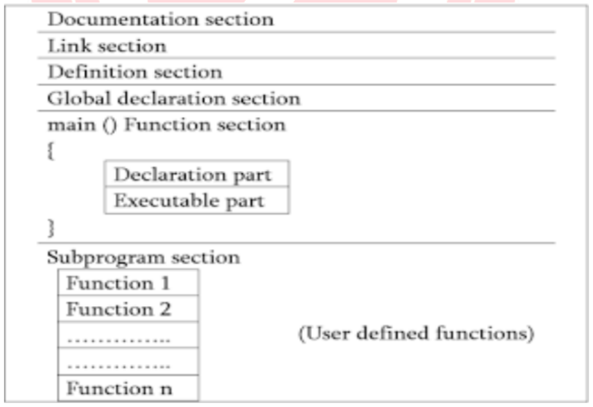


- **Describe generic structure of C program.**



Documentation section: The documentation section consists of a set
of comment lines giving the name of the program, the author and other details, which the programmer would like to use later.
Link section: The link section provides instructions to the compiler to link functions from the system library such as using the #include directive.
Definition section: The definition section defines all symbolic constants such using the #define directive.

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Global declaration section: There are some variables that are used in more than one function, Such variables are called global variables and are declared in the global declaration section that is outside of all the functions.
Declaration part: The declaration part declares all the variables used in the executable part.
Subprogram section: If the program is a multi-function program
then the subprogram section contains all the user-defined functions that are called in the main () function. User-defined functions are generally placed immediately after the main () function, although they may appear in any order.
Header files
A header file is a file with extension h which contains C function declarations and macro definitions to be shared between several source files.
Include Syntax
Both the user and the system header files are included using the preprocessing directive #include.
'main' function
main() function is the entry point of any C program. It is the point at which execution of program is started. Every C program have a main() function.

- **Write a program to take input as a number and reverse it by while loop. (Note: Any other correct logic shall be considered).**

```
#include
#include
void main()
{
int no;
int sum=0,rem;
printf("\n Enter number:");
scanf("%d",&no);
while(no>0)
{
rem=no%10;
no=no/10;
sum=sum*10+ rem;
}
printf("\nsum=%d",sum);
getch();
}
```

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- **Write a program to accept 10 numbers in array and arrange them in ascending order. (Note: Any other correct logic shall be considered).**

```
#include
#include
void main()
{ int arr[10],i,j,temp;
clrscr();
printf("Enter array elements:");
for(i=0;i<10;i++)
{
scanf("%d",&arr[i]);
}
printf("\n\n Array elements are:"); for(i=0;i<10;i++)
{
printf("%d" arr[i]);
}
for(j=0;j<10;j++)
{
for(i=0;i<10;i++)
{
if(arr[i+1]<arr[i])
{
temp=arr[i];
arr[i]=arr[i+1]; arr[i+1]=temp;
}
}
}
printf("\n\nArray elements in ascending order are:"); for(i=0;i<10;i++)
{
printf("%d ",arr[i]);
}
getch();
}
```

- **Explain meaning of following statement with reference to pointers:**
  int *a, b;
  b=20;
  ***a=b;**

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A=&b;

int *a,b;
It is declaration of integer pointer a and integer variable b
b=20;
value 20 is assigned to variable b.
***a=b;**
Value of b is assigned to pointer a.
A=&b;
Address of b is assigned to variable A.

Summer 18
4 marks

- **Develop a simple 'C' program for addition and multiplication of two integer numbers.**
  (Note: Any other relevant logic shall be considered)

```
#include
#include
void main()
{
int a,b,add,mul;
clrscr();
printf("Enter value for a and b:");
scanf("%d%d",&a,&b);
add=a+b;
mul=a*b;
printf("\nAddition of a and b=%d\n",add);
printf("\Multiplication of a and b=%d",mul);
getch();
}
```

- **Explain how to pass pointer to function with example.**
  (Note: Any other example showing pointer as a parameter in function shall be considered)

When pointer (addresses) is passed to the function as an argument instead of value then function is called as call by reference.

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Example:
```
#include
#include
int add(int *);
void main()
{
int *ptr,pos=0;
clrscr();
printf("Enter position:");
scanf("%d",&pos);
ptr=&pos;
printf("\nSum=%d",add(ptr));
getch();
}
int add(int *p)
{
int i=0;
int sum=0;
for(i=1;i<=(*p);i++)
{
sum=sum+i;
}
return sum;
}
```
In the above program function passes the address of „pos‟ to the ptr. The value of ptr is passed while calling the function. In function definition in *p it takes value of ptr instead of address for performing addition of numbers up to specific position.

- **Explain following functions:**
  - **getchar( )**
  - **putchar( )**
  - **getch( )**
  - **putch( )**

  with suitable examples.

getchar( ) - It is function from stdio.h header file. This function is used to input a single character. The enter key is pressed which is followed by the character that is typed. The character that is entered is echoed.
Syntax:

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```
ch=getchar();
Example:
void main()
{
char ch;
ch = getchar();
printf("Input Char Is :%c",ch);
}
```

During the program execution, a single character gets or read through the getchar(). The given value is displayed on the screen and the compiler waits for another character to be typed. If you press the enter key/any other characters and then only the given character is printed through the printf function.

putchar( ) - It is used from standard input (stdio.h) header file. This function is the other side of getchar. A single character is displayed on the screen.

Syntax:

```
putchar(ch);
voidmain()
{
char ch='a';
putchar(ch);
getch();
}
```

getch( ) - It is used from the console (conio.h) header file. This function is used to input a single character. The character is read instantly and it does not require an enter key to be pressed. The character type is returned but it does not echo on the screen.

Syntax:

```
ch=getch();
```

Where, ch - assigned the character that is returned by getch().

```
void main()
{
char ch;
ch = getch();
printf("Input Char Is :%c",ch);
}
```

During the program execution, a single character gets or read through the getch(). The given value is not displayed on the screen and the compiler does not wait for another character to be typed. And then, the given character is printed through the printf function.

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putch( )- It is used from console input output header file (conio.h) This function is a counterpart of getch(). Which means that it will display a single character on the screen. The character that is displayed is returned.
Syntax:
putch(ch);
Where, ch - the character that is to be printed.

```
void main()
{
char ch='a';
putch(ch)
}
```

- **Develop a program to accept an integer number and print whether it is palindrome or not.**
  (Note: If string is considered instead of number for palindrome checking, then that logic shall be considered)

```
#include
#include
void main()
{
int n,num,rev=0,digit,i;
clrscr();
printf("Enter the number: ");
scanf("%d",&num);
n=num;
for(i=0;num!=0;++i)
{
digit=num%10;
rev=rev*10+digit;
num=num/10;
}
if(n==rev)
printf("Number is palindrome");
else printf("Number is not palindrome");
getch();
}
```

- **State the use of printf( ) & scanf( ) with suitable example**

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printf( ) & scanf( ):
printf() and scanf() functions are library functions in C programming language defined in “stdio.h”.

printf() function is used to print the character, string, float, integer, octal and hexadecimal values onto the output screen.

scanf() function is used to read character, string, numeric data from keyboard.
%d format specifier is used in printf() and scanf() to specify the value of an integer variable.
%c is used to specify character,
%f for float variable,
%s for string variable,
and %x for hexadecimal variable.

Example:
```
#include
#include
void main()
{
int i;
clrscr();
printf("Enter a number");
scanf("%d",&i);
printf("Entered number is: %d",i);
getch();
}
```

- **Explain any four library functions under conio.h header file.**

clrscr() -This function is used to clear the output screen.
getch() -It reads character from keyboard
getche()-It reads character from keyboard and echoes to o/p screen
putch - Writes a character directly to the console.
textcolor()-This function is used to change the text color
textbackground()-This function is used to change text background

- **Explain how formatted input can be obtain, give suitable example.**

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Formatted input: When the input data is arranged in a specific format, it is called formatted input. scanf function is used for this purpose in C.
General syntax:
scanf(“control string”, arg1, arg2..);

Control string here refers to the format of the input data. It includes the conversion character %, a data type character and an optional number that specifies the field width. It also may contain new line character or tab. arg1, arg2 refers to the address of memory locations where the data should be stored.
Example:
scanf(“%d”,&num1);

Eg:
```
#include
#include
void main()
{
int i;
clrscr();
printf("Enter a number");
scanf("%d",&i);
printf("Entered number is: %d",i);
getch();
}
```

- **Develop a program to find factorial of a number using recursion. (Note: Any other relevant logic shall be considered)**

```
#include
#include
int factorial(int num)
{
if(num==1)
{
return 1;
}
else
{
return(num*factorial(num-1));
}
```

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```
}
void main()
{
int num;
int result;
clrscr();
printf("Enter a number");
scanf("%d",&num);
result=factorial(num);
printf("Factorial of %d is %d",num,result);
getch();
}
```

- **Write a program to sweep the values of variables a = 10, b = 5 using function. (Note : Read sweep as swap in the question) (Note: Any other logic using function shall be considered)**

```
#include
#include
void swapvalues(int *i, int *j)
{
int temp;
temp=*i;
*i=*j;
*j=temp;
}
void main()
{
int a=10;
int b=5;
clrscr();
printf("The values before swaping:\na=%d, b=%d",a,b);
swapvalues(&a,&b);
printf("\nThe values after swaping:\na=%d, b=%d",a,b);
getch();
}
```

- **Develop a program using structure to print data of three students having data members name, class, percentage. (Note: Any other relevant logic shall be considered)**

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```
#include<stdio.h>
#include<conio.h>
void main()
{
struct student
{
char name[20];
char c[20];
int per;
} s[3];
int i;
clrscr();
for(i=0;i<3;i++)
{
printf("Enter name, class, percentage");
scanf("%s%s%d", &s[i].name,&s[i].c,&s[i].per);
}
for(i=0;i<3;i++)
{
printf("%s %s %d\n",s[i].name,s[i].c,s[i].per);
}
getch();
}
```

- **Design a program to print a message 10 times. (Note: Any other relevant logic shall be considered)**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int i;
clrscr();
for(i=0;i<10;i++)
{
printf("Welcome to C programming\n");
}
getch();
}
```

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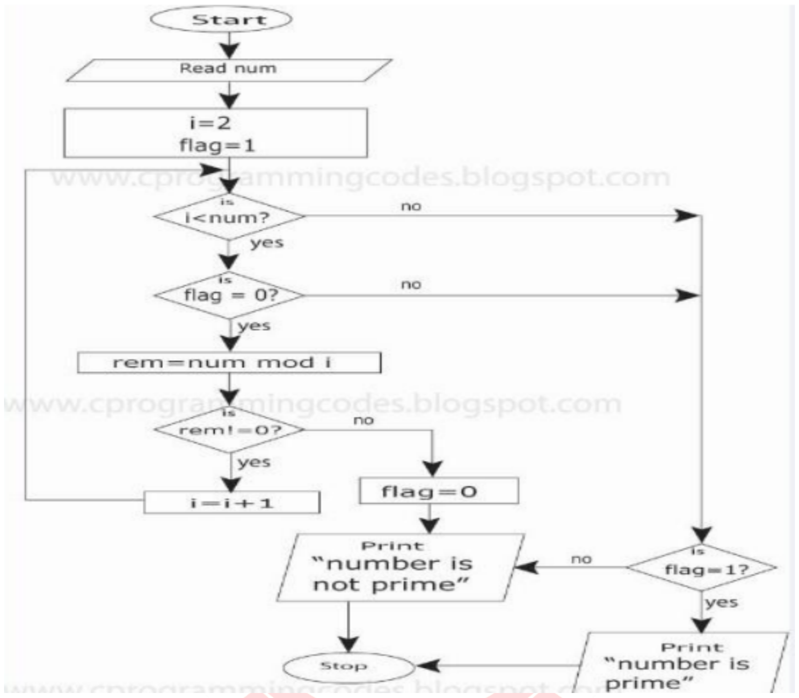
- **Draw a flowchart for checking whether given number is prime or not. (Note: Any correct flowchart shall be considered)**



- **Implement a program to demonstrate logical AND operator. (Note: Any other relevant logic shall be considered)**

```
#include
#include
void main()
{
int i;
int j;
clrscr();
printf("Enter the values of i and j");
scanf("%d%d",&i,&j);
if(i==5 && j==5)
```

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```
{
printf("Both i and j are equal to 5");
}
else
{
printf("Both the values are different and either or both are not equal to 5");
}
getch();
}
```

Winter 18
4 marks

- **Write an algorithm to determine whether a given number is divisible by 5 or not**

```
Step 1- Start
Step 2- Read / input the number.
Step 3- if n%5==0 then goto step 5.
Step 4- else number is not divisible by 5 goto step 6.
Step 5- display the output number is divisible by 5.
Step 6- Stop
```

- **Explain do-while loop with example.**

Do-While statement:

• In some applications it is necessary to execute the body of the loop before the condition is checked; such situation can be handled by do statement.
• At least once the body of loop will be executed.
• do statement, first executes the body of the loop.
• At the end of the loop, the test condition in the while statement is evaluated. If the condition is true, then it continues to execute bodyof the loop once again.
• This process continues as long as the condition is true.
• When the condition becomes false, the loops will be terminated and the control goes to next statement after while statement.

Example:
```
#include
#include
```

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```
void main()
{
int i=1;
clrscr();
printf("\n Odd numbers from 1 to 20 are \n");
do
{
if(i%2 ! = 0)
printf("\n %d", i);
i++;
}
while(i<=20); /* The loop iterates till the value of i is less than or equal to 20 */
getch();
}
```

- **Explain one dimension and two dimension arrays**

I. **One dimensional array:** An array is a collection of variables of the same type that are referred through a common name. A specific element in an array is accessed by an index. In C, all arrays consist of contiguous memory locations. The lowest address corresponds to the first element and the highest address to the last element.
Syntax: data_type array_name[array_size];
Example: int marks[10];

II. **Two dimensional array :** Two dimensional array is a collection of similar type of data elements arranged in the form of rows & columns.
Example: Array can be declared as int arr[3][3]; In this there can be 9 elements in an array with 3 rows and 3 columns.

- **Write the output of following c program**

```
#include
int main()
{
char *ptr;
char str[]=”MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION”;
ptr=str;
ptr=ptr+11;
printf(“%s”, ++ptr);
```

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```
        return 0;
        }
```

Output :

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- **Explain increment and decrement operator.**

Increment operator is used to increment or increase the value of a variable by one. It is equivalent to adding one to the value of the variable. The symbol used is ++.
The decrement operator is used to decrement or decrease the value of variable by 1. It is equivalent to subtracting one from the value of the variable. The symbol used is --.
Syntax:
++var or var++ for increment and --var or var--for decrement.

Example:

```
int m=5;
int n = ++m;
printf(%d%d",m,n);
```

When the increment operator is used prior to the variable name m, the value of the variable m is incremented first and then assigned to the variable n. The values of both the variable m and n here will be 6. But if the increment operator ++ is used after the variable name, then the value of the variable m is assigned to the variable n and then the value of m is increased. Therefore the values of m and n will be 6 and 5 respectively.

Example for decrement operator

```
int m=5;
int n=--m;
printf("%d%d",m,n);
```

or

```
#include
#include
void main()
{
int m=4,n=6;
clrscr();
printf("values of m and n before changing%d%d",m,n);
m++;
n--;
printf("\nvalues after changing%d%d",m,n);
```

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```
getch();
}
```

- **Explain User defined function with example.**

Functions are basic building blocks in a program. It can be predefined/ library functions or user defined functions. Predefined functions are those which are already available in C library. User defined functions are those which are written by the users to complete a specific task. Execution of a C program starts from main(). User defined functions should be called from main() for it to execute. A user defined function has a return type and a name. it my or may not contain parameters.
The general syntax of a user defined function :
Return_type func_name(parameter list)

Example:

```
#include
#include
void myFunc(int a)
{
printf("The value is: %d",a);
}
void main()
{
myFunc(10);
getch()
}
```

- **Explain conditional operator with example.**

Conditional operators return one value if condition is true and returns another value is condition is false. This operator is also called as ternary operator as it takes three arguments.
Syntax :
(Condition? true_value: false_value);

Example:

```
#include
#include
void main()
{
int i;
```

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```
clrscr();
printf("Enter a number:");
scanf("%d",&i);
i%2==0?printf("%d is even",i):printf("%d is odd",i) ;
getch();
}
```

- **Explain strlen() and strcpy() function with example.**

strlen()- this function is used to find the length of a string. It counts the number of characters comprising the string.

Syntax:

strlen(char[] str)- finds the length of the string str.

Example:

```
#include
#include
#include
void main()
{
char str[] = "mystring";
int len=0;
clrscr();
len=strlen(str);
printf("Length of string is :%d",len);
getch();
}
```

Strcpy()– this function is used to copy the contents of a string to other.

Syntax:

strcpy(char[] dest, char[] source)- copies the contents of the string source to destination.

Example:

```
#include
#include
#include
void main()
{
char source[]="mystring";
```

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```
char dest[10];
clrscr();
printf("%s%s",source,dest);
strcpy(dest,source);
printf("\n%s %s",source, dest);
getch();
}
```

- **Write algorithm and draw flow-chart to print even numbers from 1 to 100.**

Algorithm:-

```
1. Start
2. Initialize the variable i to 1.
3. while i<=100
4. if i%2==0
5. print the number
6. increment value of i
7. Stop
```

Flowchart:-

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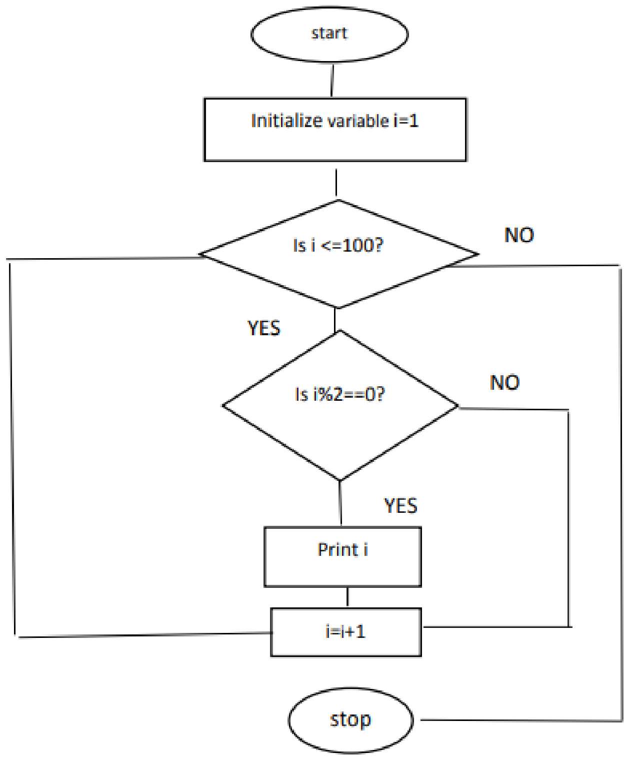

- **Write a program to accept marks of four subjects as input from user. Calculate and display total and percentage marks of student. Note: Any other correct logic shall be considered**

```
#include
#include
void main()
{
float marks[4];
float total=0.0, perc=0.0;
int i;
clrscr();
for(i=1;i<=4;i++)
{
printf("Enter marks of subject %d",i);
scanf("%f%",&marks[i]);
}
for(i=1;i<=4;i++)
{
```

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```
total=total+marks[i];
}
printf("Total is :%f",total);
perc=total/4;
printf("Percentage is %f",perc);
getch();
}
```

- **Write a program to accept the value of year as input from the keyboard & print whether it is a leap year or not.**

```
#include
#include
void main()
{
int year;
clrscr();
printf("Enter year");
scanf("%d",&year);
if(year%4==0)
{
printf("Year %d is a leap year",year);
}
else
{
printf("Year %d is not a leap year",year);
}
getch();
}
```

- **Write a program to accept a string as input from user and determine its length. [Don't use built in library function strlen()]**

```
#include
#include
void main()
{
char str[50];
int i, len=0;
clrscr();
```

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```
printf("Enter a string");
scanf("%s",&str);
for(i=0; str[i]!='\0'; i++)
{
len++;
}
printf("The length of string is %d",len);
getch();
}
```

- **Write a program to swap two numbers using call be value**

```
#include
#include
void swap(int a, int b)
{
int temp;
temp=a;
a=b;
b=temp;
printf("Numbers after swapping no1=%d and no2=%d",a,b);
}
void main()
{
int no1, no2;
clrscr();
printf("Enter the 2 numbers");
scanf("%d%d",&no1,&no2);
printf("Numbers before swapping no1=%d and no2= %d",no1, no2);
swap(no1,no2);
getch();
}
```

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4 marks

- **State the importance of flow chart.**

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A flowchart is a type of diagram that represents an algorithm. It is a visual representation of a sequence of steps to complete the process. A flow chart describes a process using symbols rather than words. Computer programmers use flow charts to show where data enters the program, what processes the data goes through, and how the data is converted to output.
-can be used to quickly communicate the ideas or plans that one programmer envisions to other people who will be involved in the process.
- aid in the analysis of the process to make sure nothing is left out and that all possible inputs, processes, and outputs have been accounted for.
-help programmers develop the most efficient coding because they can clearly see where the data is going to end up.
- help programmers figure out where a potential problem area is and helps them with debugging or cleaning up code that is not working.
- are a useful tool in visualizing a module's flow of execution before writing any code.
This allows developers to do three things: verify the algorithm's correctness before writing code, visualize how the code will ultimately be written, and communicate and document the algorithm with other developers and even non-developers.
-may be used in conjunction with other tools, such as pseudo-code, or may be used by itself to communicate a module's ultimate design, depending on the level of detail of the flowchart.

- **Write a program to declare structure student having rollno, name & marks. (Note: Any other correct logic shall be considered).**
  Accept and display data for three students.

```
#include
#include
void main()
{
int i;
struct student
{
int rollno;
char name[20];
int marks;
}
s[3];
clrscr();
for(i=0;i<3;i++)
{
printf("Enter rollno, name and marks\n");
```

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```
scanf("%d%s%d", &s[i].rollno,&s[i].name,&s[i].marks);
}
for(i = 0; i<3;i++)
{
printf("\nThe details of student %d\n",i+1);
printf("Roll no %d\n",s[i].rollno);
printf("Name is %s\n",s[i].name);
printf("Marks %d\n",s[i].marks);
}
getch();
}
```

- **Explain pointer arithmetic with example. (Note: Code snippet shall be considered).**

The pointer arithmetic is done as per the data type of the pointer. The basic operations on pointers are:

Increment:
It is used to increment the pointer. Each time a pointer is incremented, it points to the next location.
Eg, for an int pointer variable, if the current position of pointer is 1000, when incremented it points to 1002 because for storing an int value it takes 2 bytes of memory.

Decrement:
It is used to decrement the pointer. Each time a pointer is decremented, it points to the previous location.
Eg, if the current position of pointer is 1002, then decrement operation results in the pointer pointing to the location 1000.

Addition and subtraction:
When addition or subtraction operation is performed on the pointer variable, it shows that particular location in the memory.
Eg:
int *ptr; -say address is 1000.
If -> ptr+n- then ptr+n*2 .
If -> ptr-n thenptr-n*2.

```
#include
#include
void main()
{
int i = 10;
```

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```
int *ptr=&i;
clrscr();
printf("%x%d",ptr,i);
ptr++;
printf("\n%x%d",ptr,i);
printf("\n%x",ptr+2);
printf("\n%x",ptr-2);
getch();
}
```

- **Explain nested if-else with example. (Note: Any example shall be considered)**

When a series of decision is required, nested if-else is used. Nesting means using one if-else construct within another one. If the condition in the outer if, is true, then only the inner if-else will get executed. Further the statements in the inner if will get execute only if the condition of inner if, evaluates to true. If it is false, the statements in inner else will get executed.
If the outer if evaluates to false, then the statements in outer else get executed.

General syntax:

```
if(condition)
{
if(condition)
{
statements
}
else
{
Statements
 }
 }
else
{
statements
}
statements
```

Example:

```
#include
```

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```
#include
void main()
{
int val;
clrscr();
printf("Enter a number");
scanf("%d",&val);
if(val>=5)
{
if(val>5)
{
printf("Number is greater than 5");
}
else
{
printf("Number is equal to 5");
}
}
else
{
printf("Number is less than 5");
}
getch();
}
```

- **Describe the following terms:**
  - **Keyword**
  - **Identifier**
  - **Variable**
  - **Constant**

(i) Keyword: Keywords are special words in C programming which have their own predefined meaning. The functions and meanings of these words cannot be altered. Some keywords in C Programming are if, while, for, do, etc..

(ii) Identifier: Identifiers are user-defined names of variables,
functions and arrays. It comprises of combination of letters and digits.
Example
int agel;

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float height_in_feet;
Here, agel is an identifier of integer data type.
Similarly height feet is also an identifier but of floating integer data type,

(iii) Variable: A variable is nothing but a name given to a storage
area that our programs can manipulate. Each variable in Chas a specific type, which determines the size and layout of the variable's memory; the range of values that can be stored within that memory; and the set of operations that can be applied to the variable.
Example: add, a, name

(iv) Constant: Constants refer to fixed values that the program may not change during its execution. These fixed values are also called literals. Constants can be of any of the basic data types like an integer constant, a floating constant, a character constant, or a string literal. There are enumeration constants as well.
Example:
121
234
3.14

- **Differentiate between call by value and call by reference**

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Sr. No.	Call by value	Call by reference
1	When function is called by passing values then it is call by value	When function is called by passing address of variable then it is called as call by reference.
2	Copy of actual variable is created when function is called.	No copy is generated for actual variable rather address of actual variable is passed.
3	In call by value, memory required is more as copy of variable is created.	In call by reference, memory required is less as there is no copy of actual variables.
4	Example:- Function call - Swap (x,y); Calling swap function by passing values.	Example:- Function call – Swap (&x, &y); Calling swap function by passing address.
5	Original (actual) parameters do not change. Changes take place on the copy of variable.	Actual parameters change as function operates on value stored at the address.

- **Explain conditional operator with example.**

Conditional Operator (Ternary Operator):
It takes the form „? :" to construct conditional expressions
The operator „? :" works as follows:
exp1 ? exp2 : exp 3
Where exp1, exp2 and exp3 are expressions.exp1 is evaluated first, If it is true, then the expression exp2 is evaluated and becomes the valueof the expression. If exp1 is false, exp3 is evaluated and its value becomes the value of the expression.
E.g.
int a=10,b=5,x;
x=(a>b) ? a : b;

- **List the categories of functions and explain any one with example.**

Different categories of function:

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1) Function with no arguments and no return value.
2) Function with arguments and no return value.
3) Function with no arguments and return value.
4) Function with arguments and return value.

1) **Function with no arguments and no return value:** This category of function cannot return any value back to the calling program and it does not accept any arguments also. It has to be declared as void.

For example:

```
void add()
{
Int a,b,c;
a=5;
b=6;
c=a+b;
printf("%d",c);
}
```

It should be called as add();

2) **Function with arguments and no return value:** This category of function cannot return any value back to the calling program but it takes arguments from calling program. It has to be declared as void. The number of arguments should match in sequence, number and data type. For example:

```
void add(intx,int y)
{
int z;
z=x+y;
printf("%d",z);
}
```

It should be called as add(4,5); where x will take 4 and y will take 5 as their values.

3) **Function with no arguments and return value:** This category of function can return a value back to the calling program but it does not take arguments from calling program. It has to be declared with same data type as the data type of return variable.

For example:

```
int add()
{
inta,b,c;
a=5;
```

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```
b=6;
c=a+b;
return(c);
}
```

It should be called as int x = add(); where x will store value returned by the function.

4) **Function with arguments and return value:** This category of function can return a value back to the calling program but it also takes arguments from calling program. It has to be declared with same data type as the data type of return variable.

   For example:

```
int add(intx,int y)
{
int z;
z=x+y;
return(z);
}
```

   It should be called as int s = add(4,5); where x will have 4 and y will have 5 as their values and s will store value returned by the function.

- **Write an algorithm to determine the given number is odd or even.**

```
Step 1- Start
Step 2- Read / input the number.
Step 3- if n%2==0 then number is even.
Step 4- else number is odd.
Step 5- display the output.
Step 6- Stop
```

- **Illustrate the use of break and continue statement with example.**
  (Note:- Any other example shall be considered)

Break:
It breaks the execution of the loop which allows exiting from any loop or switch, such that break statement skips the remaining part of current iterations of the loop.
Syntax: break;

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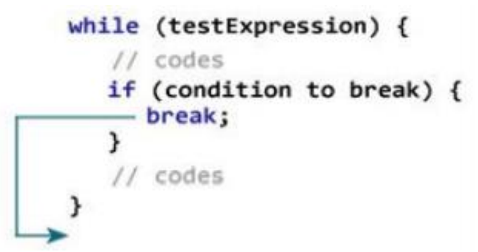
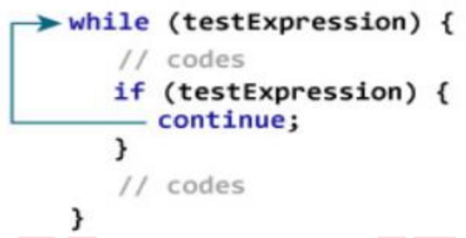


```
while (testExpression) {
   // codes
   if (condition to break) {
      break;
   }
   // codes
}
```

Continue: It is used when it is required to skip the remaining portion of the loop without breaking loop it will transfer control directly to next iteration
Syntax: continue;



```
while (testExpression) {
   // codes
   if (testExpression) {
      continue;
   }
   // codes
}
```

In given program sequence if "break" executes then execution control will jump out of loop & next statement after loop will be executed. In given program sequence if "continue" executes then execution control will skip remaining statements of loop & will start next iteration of loop

- **Write a program to add, subtract, multiply and divide two numbers, accepted from user switch case. (Note: Any other correct logic shall be considered).**

```
#include
#include
void main()
{
int a,b,ch,add,sub,mul,div;
clrscr();
printf("\n1 for addition \n2 for substraction");
printf("\n3 for multiplication \n4 for division");
printf("\nEnter two numbers:");
scanf("%d%d",&a,&b);
printf("\nEnter your choice:");
scanf("%d",&ch);
switch(ch)
{
case 1:
```

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```
add=a+b;
printf("Addition of a & b=%d",add);
break;

case 2:
sub=a-b;
printf("Substraction of a & b=%d",sub);
break;

case 3:
mul=a*b;
printf("Multiplication of two numbers=%d",mul);
break;

case 4:
div=a/b;
printf("Division of two numbers=%d",div);
break;

default:
printf("Invalid choice....");
}
getch();
}
```

- **Illustrate initialization of two dimensional array with example.**

Two dimensional array:
The array which is used to represent and store data in a tabular form is called as two dimensional array. Such type of array is specially used to represent data in a matrix form.
Initialization can be done as design time or runtime.

1. **Design time:** This can be done by providing „row X column‟ number of elements to the array.
   Eg for a 3 rows and 4 columns array ,
   3X4=12 elements can be provided as :
   ```
   arr[3][4]={ {2,3,4,6},
   {1,4,6,3},
   {6,6,4,3},
   {6,7,8,9}
   };
   ```

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2. **Runtime:** For this loop structures like „for‟ can be used in a nested form, where outer loop will increment row and inner loop will increment column.
   Eg : Eg:

```
for(i=0;i<3;i++)
{
for(j=0;j<4;j++)
{
scanf("%d", &arr[i][j]);
}
}
```

   Example:

```
main()
{
int arr[2][2]={{1,2},{4,5}};
int i,j;
for(i=0;i<2;i++)
{
for(j=0;j<2;j++)
{
printf( "%d", arr[i][j]);
}
printf("\n");
}
}
```

- **Write a program to read two strings and find whether they are equal or not. (Note: Any other correct logic shall be considered).**

```
#include
#include
#include
void main()
{
char st1[20],st2[20];
printf("enter string 1");
scanf("%s",st1);
printf("enter second string");
scanf("%s",st2);
if(strcmp(st1,st2)==0)
```

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printf("\nboth strings are equal");
else
printf("\nstrings are not equal");
}

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4 marks

a) Explain any four guidelines for preparation of flowchart.

1.Understand the Problem: Before creating a flowchart, thoroughly understand the problem or process you are representing. Identify the input, output, and key steps involved.

2.Use Standard Symbols: Utilize standard flowchart symbols for processes, decisions, inputs/outputs, connectors, etc. This ensures that your flowchart is easily understandable and follows widely accepted conventions.

3.Keep it Simple and Clear: Aim for simplicity and clarity. Avoid unnecessary details and make sure that the flowchart is easy to follow. Use concise labels for processes and decisions.

4.Maintain Consistency: Be consistent with the use of symbols and formatting throughout the flowchart. This helps in maintaining a clean and organized visual representation.

b) Differentiate between while loop and do while loop.

Aspect	while Loop	do-while Loop
Execution Control	Condition is evaluated before the loop body is executed.	Loop body is executed at least once before checking the condition.
Initial Check	If the condition is false initially, the loop body is not executed.	The loop body is executed at least once, regardless of the initial condition.
Syntax	while (condition) { // Code to be executed while the condition is true }	do { // Code to be executed at least once } while (condition);

Example	while (i < 5) {
	printf("%d\n", i);
	i++;
	}
		do
		{ printf("%d\n", i);
		i++;
		}
		while (i < 5);

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c) Explain declaration and initialization of one dimensional array using example.

Declaration: In C, to declare a one-dimensional array, specify the data type of its elements followed by the array name and the size of the array in square brackets.

Initialization: To initialize an array, provide the values for each element enclosed in curly braces {} at the time of declaration.
Example:

```
#include <stdio.h>
int main() {
   // Declaration and initialization of an integer array
   int numbers[5] = {1, 2, 3, 4, 5};
   // Accessing and printing elements of the array
   for (int i = 0; i < 5; i++) {
      printf("Element %d: %d\n", i, numbers[i]);
   }
   return 0;
}
```

In this example, an integer array numbers is declared and initialized with values 1, 2, 3, 4, and 5. The for loop is then used to iterate through the array and print its elements.

d) Write output for following programming code:

```
#include<stdio.h>
#include<conio.h>
void main ( )
{
int x, y, a, b, *P1, *P2 ;
x = 10 ;
y = 20 ;
P1 = &x ;
P2 = &y ;
a = *P1 * *P2+20 ;
b = *P1 * *P2–20 ;
print f(“x=%d, y=%d”, x,y) ;
print f(“a=%d, b=%d”, a,b) ;
}
```

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Ans:
It appears that there are a few syntax errors and issues in the provided code:
1)void main() should be corrected to int main().
2)print f should be corrected to printf.
3) <conio.h> is not a standard header in C, and getch() is not used in the code, so you can remove it.

e) Explain data type conversion with example.

Data type conversion, also known as type casting, is the process of converting a value from one data type to another. Implicit conversion occurs automatically by the compiler, while explicit conversion (casting) involves the programmer specifying the conversion.

Example:
```
#include <stdio.h>

int main() {
   int integerNumber = 10;
   double doubleNumber;

   // Implicit Conversion
   doubleNumber = integerNumber; // int to double

   printf("Implicit Conversion: %lf\n", doubleNumber);

   // Explicit Conversion (Casting)
   doubleNumber = (double)integerNumber; // int to double

   printf("Explicit Conversion: %lf\n", doubleNumber);

   return 0;
}
```

In this example, an integer variable integerNumber is implicitly and explicitly converted to a double variable doubleNumber.

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f) Explain any two string handling functions with syntax and example.

1.strlen() - String Length:This function calculates and returns the length of the string str. It does not include the null-terminating character ('\0') in the count. The function takes a pointer to a constant character (const char *str) as its argument.

syntax:
```
#include <string.h>
size_t strlen(const char *str);
```

example:
```
#include <stdio.h>
#include <string.h>

int main() {
    char str[] = "Hello, World!";
    size_t length = strlen(str);
    printf("Length of the string: %zu\n", length);
    return 0;
}
```
In this example, strlen() is used to determine the length of the string "Hello, World!" and prints the result.

2.strcpy() - String Copy:This function copies the contents of the string src to the string dest. It returns a pointer to the destination string (char *dest). Both src and dest should be null-terminated strings. If dest is not large enough to accommodate the contents of src, it may lead to undefined behavior.

syntax:
```
#include <string.h>
char *strcpy(char *dest, const char *src);
```

example:
```
#include <stdio.h>
#include <string.h>

int main() {
    char source[] = "Hello";
    char destination[20];
```

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```
    // Copy source to destination
    strcpy(destination, source);

    printf("Copied string: %s\n", destination);
    return 0;
}
```

In this example, strcpy() is used to copy the contents of the string "Hello" to the destination string, which is then printed.

g) Describe scanf() function with its syntax and example.

The scanf() function is used for reading input from the standard input (keyboard) in C.The scanf() function is a part of the C Standard Library and is used for reading input from the standard input. It allows the program to interact with the user by capturing input data.

Syntax:

```
#include <stdio.h>
int scanf(const char *format, ...);
```

Example:

```
#include <stdio.h>

int main() {
    int num;
    printf("Enter an integer: ");
    scanf("%d", &num); // Reads an integer from the user
    printf("You entered: %d\n", num);
    return 0;
}
```

In this example, scanf("%d", &num) reads an integer from the user and stores it in the variable num**.**

h) Describe how recursive function is used in calculating factorial of a number.

A recursive function is a function that calls itself, either directly or indirectly, to solve a smaller instance of the same problem. Calculating the factorial of a number is a classic example of using recursion in programming. The factorial of a non-negative integer n is the product of all positive integers less than or equal to n and is denoted by n!.

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The factorial function is defined as follows:
n!=n×(n−1)×(n−2)×…×2×1

A recursive function to calculate the factorial of a number in C looks like this:

```
#include <stdio.h>

// Recursive function to calculate factorial
int factorial(int n) {
   // Base case: factorial of 0 or 1 is 1
   if (n == 0 || n == 1) {
      return 1;
   }
   // Recursive case: n! = n * (n-1)!
   else {
      return n * factorial(n - 1);
   }
}

int main() {
   int num;
   printf("Enter a non-negative integer: ");
   scanf("%d", &num);

   // Call the recursive function to calculate factorial
   int result = factorial(num);

   printf("Factorial of %d is: %d\n", num, result);

   return 0;
}
```

Here's how the recursive factorial function works:

1)The base case checks if n is 0 or 1. If true, it returns 1 because the factorial of 0 or 1 is 1.
2)If n is greater than 1, the function returns n multiplied by the factorial of n−1, making a recursive call to itself with a smaller instance of the problem.
3)The recursion continues until the base case is reached, and then the results are multiplied back up the chain.
For example, if the user enters 5, the recursive calls would be as follows:

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5!=5×4!=5×4×3!=5×4×3×2!=5×4×3×2×1!=5×4×3×2×1×0!

The base case is reached when n=0 or n=1, and the recursion stops. The final result is then calculated by multiplying the values back up the chain, giving the factorial of 5.

i) Write an algorithm and draw a flowchart to find largest number from three numbers.

Algorithm to Find the Largest Number from Three Numbers:

1)Start
2)Input three numbers: num1, num2, num3.
3)Set largest to the value of num1.
4)If num2 is greater than largest, set largest to the value of num2.
5)If num3 is greater than largest, set largest to the value of num3.
6)Output the value of largest as the result.
7)End

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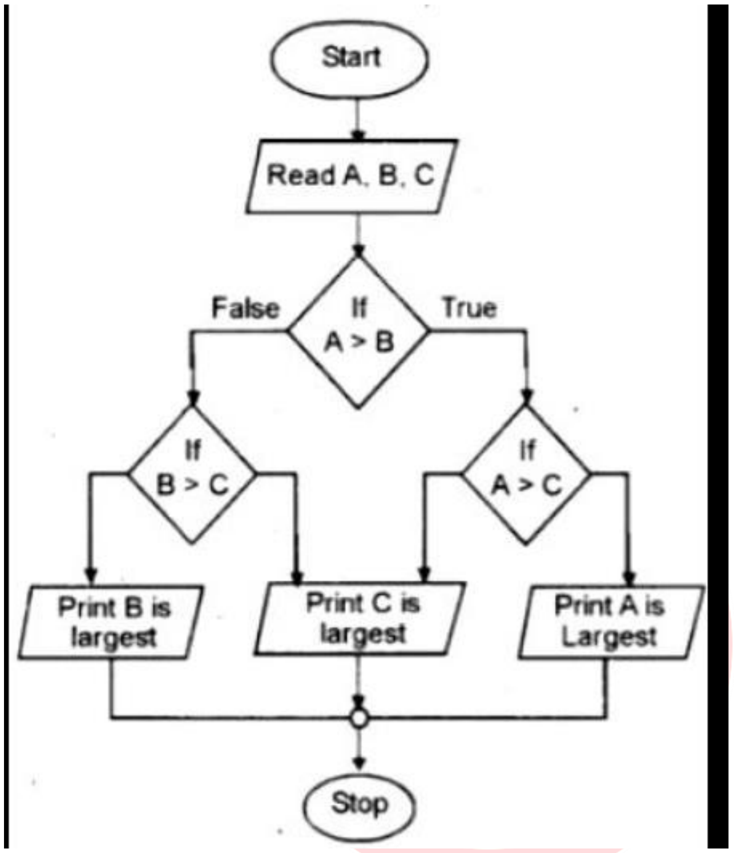
Flowchart:



j) Write a program to convert temperature in Fahrenheit degrees to Centigrade degrees.

```
#include <stdio.h>

int main() {
   // Input temperature in Fahrenheit
   double fahrenheit;
   printf("Enter temperature in Fahrenheit: ");
   scanf("%lf", &fahrenheit);

   // Convert Fahrenheit to Celsius
   double celsius = (fahrenheit - 32) * 5.0 / 9.0;
```

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```
    // Output temperature in Celsius
    printf("Temperature in Celsius: %.2lf\n", celsius);

    return 0;
}
```

k) Write a C program to print following pattern using loop
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

```
#include <stdio.h>

int main() {
    int rows = 5;

    for (int i = 1; i <= rows; i++) {
        for (int j = 1; j <= i; j++) {
            printf("%d ", i);
        }
        printf("\n");
    }

    return 0;
}
```

l) Write a program to declare an array of 5 elements and display sum of all array elements.

```
#include <stdio.h>

int main() {
    int array[5] = {1, 2, 3, 4, 5};
    int sum = 0;

    // Calculate the sum of array elements
    for (int i = 0; i < 5; i++) {
        sum += array[i];
    }
```

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```
    // Display the sum
    printf("Sum of array elements: %d\n", sum);

    return 0;
}
```

m) Write a C program using function to find area of circle.

```
#include <stdio.h>

// Function to calculate the area of a circle
double calculateArea(double radius) {
    return 3.14 * radius * radius;
}

int main() {
    double radius;

    // Input radius from user
    printf("Enter the radius of the circle: ");
    scanf("%lf", &radius);

    // Call the function to calculate the area
    double area = calculateArea(radius);

    // Display the area of the circle
    printf("Area of the circle: %.2lf\n", area);

    return 0;
}
```

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Winter 19
6 marks

- **Write a program to calculate sum of all the odd numbers between 1 to 20. (Note: Any other correct logic shall be considered).**

```
#include
#include
void main()
{
Int i,sum=0;
clrscr();
for(i=1;i<=20;i++)
{
if(i%2!=0)
{
sum=sum+i;
}
}
printf("Sum=%d",sum);
getch();
}
```

- **Write a program for addition of two 3 x 3 matrices. (Note: Any other correct logic shall be considered).**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[3][3],b[3][3],c[3][3],i,j;
clrscr();
printf("\n Enter first matrix"); for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
scanf("%d",&a[i][j]);
}
```

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```
printf("\n Enter second matrix");
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
scanf("%d",&b[i][j]);
}
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
c[i][j]=a[i][j]+b[i][j];
printf("\n Addition:\n"); for(i=0;i<3;i++)
{ for(j=0;j<3;j++)
{
printf("%d\t",c[i][j]);
}
printf("\n");
}
getch();
}
```

- **Write a program to compute the sum of all elements stored in an array using pointers. (Note: Any other correct logic shall be considered).**
-

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[5],sum=0,i,*ptr;
clrscr();
printf("\n Enter array elements:");
for(i=0;i<5;i++)
scanf("%d",&a[i]);
ptr=&a[0];
for(i=0;i<5;i++)
{
sum-sum+(*ptr);
ptr ptr+1;
```

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```
}
printf("\n Sum=%d",sum);
getch();
}
```

- **Write a program to sort elements of an array in ascending order. (Note: Any other correct logic shall be considered).**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[5],i,j,temp;
clrscr();
printf("\n Enter array elements:");
for(i=0;i<5;i++)
scanf("%d",&a[i]);
for(i=0;i<5;i++)
{
for(j=0;j<4-i;j++)
{
if(a[j]>a[j+1])
{
temp=a[j];
a[j]=a[j+1];
a[j+1]=temp;
}
}
}
for(i=0;i<5;i++)
printf("\n %d",a[i]);
getch();
}
```

- **Write a function to print Fibonacci series starting from 0, 1. (Note: Any other correct logic shall be considered).**

```
void Fibbo()
{
```

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```
inta,b,c,limit,i;
printf("\n Enter number:");
scanf("%d",&limit);
a=0;
b=1;
printf("%d\t%d",a,b);
for(i=0;i<limit-2;i++)
{
c=a+b;
printf("\t%d",c);
a=b;
b=c;
}
}
```

- **Calculate factorial of a number using recursion. (Note: Explanation /algorithm /program shall be considered)**

```
#include
#include
int factorial(int no)
{
if(no==1)
return(1);
else
return(no*factorial(no-1));
}
void main()
{
intfact,no;
clrscr();
printf("\n Enter number");
scanf("%d",&no);
fact=factorial(no);
printf("\n Factorial number=%d",fact);
getch();
}
```

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Summer 19
6 marks

- **Write a program to perform addition, subtraction, multiplication and division of two integer number using function.**
  (Note: Any other correct logic shall be considered).

```
#include<stdio.h>
#include<conio.h>
void add(int x, int y)
{
printf("\nAddition=%d",x+y);
} void sub(int x,int y)
{ printf("\nSubtraction=%d",x-y); }
void mult(int x, int y)
{ printf("\nMultiplication=%d",x*y);
}
void div(int x,int y)
{
printf("\nDivision=%d",x/y);
}
void main()
{
intx,y;
clrscr();
printf("Enter x:");
scanf("%d",&x);
printf("Enter y:");
scanf("%d",&y);
add(x,y);
sub(x,y);
mult(x,y);
div(x,y);
getch();
}
```

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- **Define Array. Write a program to accept ten numbers in array. Sort array element and display.**

Definition of Array:
An array is a collection of data elements, all of the same type, accessed using a common name
Program:

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[10],i,j,temp;
clrscr();
printf("Enter numbers:");
for(i=0;i<10;i++)
scanf("%d",&a[i]);
for(i=0;i<10;i++)
{
for(j=i+1;j<10;j++)
{
if(a[i]>a[j])
temp=a[i];
a[i]=a[j];
a[j]=temp;
}
printf("\n Sorted array elements:");
for(i=0;i<10;i++)
printf("\n %d",a[i]);
getch();
}
```

- **Write a program to print reverse of a entered string using pointer. (Note: Any other correct logic shall be considered).**

```
#include
#include
void main()
{
char str[10],*ptr;
int 1=0;
clrscr();
```

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```
printf("Enter string:");
scanf("%s", str);
ptr=str;
while(*ptr!='\0')
{
l=1+1;
ptr ptr+1;
}
while(10)
{
ptr ptr-1;
printf("%c", *ptr);
-1;
}
getch();
}
```

- **Explain recursion with suitable example. List any two advantages.**

Recursion means a function calls itself repetitively. A recursive function contains a function call to itself inside its body.

Example:

```
#include
#include
int factorial(int N);
void main()
{
int N,fact;
clrscr();
printf("Enter number:");
scanf("%d",&N);
fact=factorial(N);
printf("\n Factorial is:%d",fact); getch();
}
int factorial(int N)
{
if(N==1)
return(1);
else
```

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```
return(N*factorial(N-1));
}
```

Advantages:

- Reduces length of the program
- Reduces unnecessary calling of a function.
- Useful when same solution is to be applied many times.

- **Write a program to accept ten numbers and print average of it. (Note: Program without array shall be considered).**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[10],i,sum=0;
float avg;
for(i=0;i<10;i++)
scanf("%d",&a[i]);
for(i=0;i<10;i++)
sum=sum+a[i];
clrscr();
printf("Enter numbers:");
avg-sum/10;
printf("\n Average =%f", avg);
getch();
}
```

- **Enlist different format specifiers with its use.**

Format specifier tells the compiler what type of data a variable holds during taking input and printing output using scanf() and printf() functions respectively.
Format specifiers used in C programming:

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Format specifier	Use
%d	Specify data type as short signed
%u	Specify data type as short unsigned
%ld	Specify data type as long singed
%lu	Specify data type as long unsigned
%x	Specify data type as unsigned hexadecimal
%o	Specify data type as unsigned octal
%f	Specify data type as float
%lf	Specify data type as double
%Lf	Specify data type as long double
%c	Specify data type as signed character
%s	Specify data type as unsigned group of characters(Strings)

Winter 18
6 marks

- **Write a program using switch statement to check whether entered character is VOWEL or CONSONANT Note : Assume that the entered character is only alphabet.**

```
#include
#include
void main()
{
char ch;
clrscr();
printf("Enter character:");
scanf("%c",&ch);
switch(ch)
{
case 'a':
case 'e':
case 'i':
case 'o':
case 'u':
case 'A':
case 'E':
case 'I':
case 'O':
```

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```
case 'U':
printf("\n Entered character is VOWEL");
break;
default:
printf("\n Entered character is CONSONANT");
}
getch();
}
```

- **Write a program for addition of two 3 x 3 matrices.**

```
#include<stdio.h>
#include<conio.h> void main()
{
int a[3][3],b[3][3],c[3][3],i,j;
clrscr();
printf("Enter first matrix elements:\n");
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
scanf("%d",&a[i][j]);
}
}
printf("\nEnter second matrix elements:\n");
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
scanf("%d",&b[i][j]);
}
}
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
c[i][j]=a[i][j]+b[i][j];
}
}
```

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```
printf("\n\nAddition of two matrices is:");
for(i=0;i<3;i++)
{
for(j=0;j<3;j++)
{
printf("%d\t",c[i][j]);
}
}
getch();
}
```

- **Write a program to Print values of variables and their addresses.**
  Note : 1) Variables can be of any data type.
  2)Use of & or pointer to display address shall be considered.

```
#include
#include
void main()
{
int a,b;
clrscr();
a=5;
b=10;
printf("\n Value of a=%d",a);
printf("\n Address of a=%u",&a);
printf("\n Value of b=%d",b);
printf("\n Address of b=%u",&b);
getch();
}
```

- **Write a program to declare structure employee having data member name, age, street and city. Accept data for two employees and display it. Note : Two structure variables or array of structure variables shall be considered.**

```
#include<stdio.h>
#include<conio.h>
struct employee
{
```

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```
char name[10],street[10],city[10];
int age;
};
void main()
{
int i;
struct employee e[2];
clrscr();
for(i=0;i<2;i++)
{
printf("\n Enter name:");
scanf("%s", &e[i].name);
printf("\n Enter age:");
scanf("%d",&e[i].age);
printf("\n Enter street:");
scanf("%s", &e[i].street);
printf("\n Enter city:");
scanf("%s",&e[i].city);
}
for(i=0;i<2;i++)
{
printf("\n Name=%s",e[i].name);
printf("\n Age=%d",e[i].age);
printf("\n Street=%s",e[i].street);
printf("\n City=%s",e[i].city);
}
getch();
}
```

- **If the value of a number (N) is entered through keyboard. Write a program using recursion to calculate and display factorial of number (N).**

```
#include
#include
int factorial(int N);
void main()
{
int N,fact;
```

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```
clrscr();
printf("Enter number:");
scanf("%d",&N);
fact=factorial(N);
printf("\n Factorial is:%d",fact);
getch();
}
int factorial(int N)
{
if(N==1)
return(1);
else
return(N*factorial(N-1));
}
```

- **Write a program to accept two numbers from user and perform addition, subtraction, multiplication and division operations using pointer.**
-

```
#include
#include
void main()
{
int no1,no2,*ptr1,*ptr2,result;
clrscr();
printf("Enter no1:");
scanf("%d",&no1);
printf("\nEnter no2:");
scanf("%d",&no2);
ptr1=&no1;
ptr2=&no2;
result=*ptr1+*ptr2;
printf("\n Addition=%d",result);
result=*ptr1-*ptr2;
printf("\n Subtraction=%d",result);
result=*ptr1**ptr2;
printf("\n Multiplication=%d",result);
result=*ptr1/(*ptr2);
printf("\n Division=%d",result);
getch();
```

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}

Summer 18
6 marks

- **Draw a flowchart of Do-while loop and write a program to add numbers until user enters zero.**

Flowchart of Do-while loop:

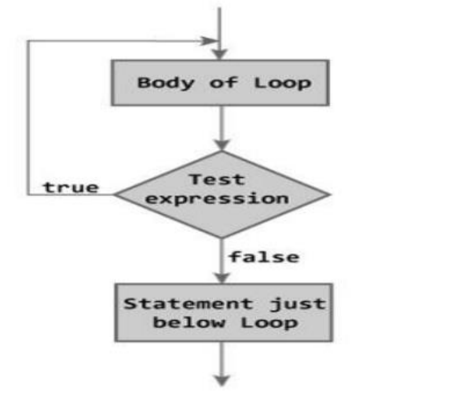

Figure: Flowchart of do...while Loop

Program:-

```
#include
#include
void main()
{
int no,sum=0;
clrscr();
do
{
printf("\n Enter a number:");
scanf("%d",&no);
sum=sum+no;
}
while(no!=0);
printf("\n Sum of entered numbers =%d",sum);
getch();
}
```

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- **Give a method to create, declare and initialize structure also develop a program to demonstrate nested structure. Declaration of structure:-**

Declaration of structure:-

```
struct structure_name
{
data_type member 1;
data_type member 2;
.
.
.
data_type member n;
} structure variable 1, structure variable 2,..., structure variable n;
```

Example:-

```
struct student
{
int rollno;
char name[10];
}s1;
```

Initialization:-

```
struct student s={1,"abc"};
```

structure variable contains two members as rollno and name. the above example initializes rollno to 1 and name to "abc".

Program:-

```
#include
#include
struct college
{
int collegeid;
char collegename[20];
};
struct student
{
int rollno;
char studentname[10];
```

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```
struct college c;
};
void main()
{
struct student s={1,"ABC",123,"Polytechnic"};
clrscr();
printf("\n Roll number=%d",s.rollno);
printf("\n Student Name=%s",s.studentname);
printf("\n College id=%d",s.c.collegeid);
printf("\n College name=%s",s.c.collegename);
getch();
}
```

- **Implement a program to demonstrate concept of pointers to function. (Note: Any other relevant program shall be considered)**

Pointer to function:

```
include<stdio.h>
int sum(int x, int y)
{
return x+y;
}
int main()
{
int s;
int(*fp)(int, int);
fp = sum;
s = fp(10,12);
printf("Sum = %d",s);
return 0;
}
```

- **Develop a program to swap two numbers using pointer and add swaped numbers also print their addition. (Note: Any other relevant logic shall be considered)**

```
#include<stdio.h>
void swap(int *a,int *b)
{
int temp;
```

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```
temp=*a;
*a=*b;
*b=temp;
}
void main()
{
int x,y,sum;
printf("\n Enter value for x:");
scanf("%d",&x);
printf("\n Enter value for y:");
scanf("%d",&y);
swap(&x,&y);
printf("\nx=%d",x);
printf("\ny=%d",y);
sum=x+y;
printf("Sum of x+y = %d",sum);
}
```

- **Design a programme in C to read the n numbers of values in an array and display it in reverse order. (Note: Any other relevant logic shall be considered)**

```
#include<stdio.h>
#include<conio.h>
#define max 50
void main()
{
int a[max],i,n;
clrscr();
printf("\n Enter number of elements:");
scanf("%d",&n);
printf("\n Enter array element:");
for(i=0;i<n;i++)
scanf("%d",&a[i]);
printf("\n Array elements in reverse order:");
for(i=n-1;i>=0;i--)
printf("\t%d",a[i]);
getch();
}
```

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Develop a program to find diameter, circumference and area of circle using function. (Note: Any other relevant logic shall be considered)

```
#include<stdio.h>
#include<conio.h>
void circle(float r)
{
float diameter, circumference,area;
diameter=2*r;
printf("\n Diameter=%f", diameter);
circumference=2*3.14*r;
printf("\n Circumference=%f", circumference);
area=3.14*r*r;
printf("\n Area=%f",area);
}
void main()
{
float radius;
clrscr();
printf("\n Enter radius:");
scanf("%f",&radius);
circle(radius);
getch();
}
```

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Winter 22
6 marks

a) Write a C program with comments to reverse the digit of integer number. For example the number 12345 should be displayed as 54321.

```
#include <stdio.h>

int main() {
   int number, reversedNumber = 0;

   // Input the number
   printf("Enter an integer: ");
   scanf("%d", &number);

   // Reverse the digits of the number
   while (number != 0) {
      reversedNumber = reversedNumber * 10 + number % 10;
      number = number / 10;
   }

   // Display the reversed number
   printf("Reversed number: %d\n", reversedNumber);

   return 0;
} #include <stdio.h>

int main() {
   int number, reversedNumber = 0;

   // Input the number
   printf("Enter an integer: ");
   scanf("%d", &number);

   // Reverse the digits of the number
   while (number != 0) {
      reversedNumber = reversedNumber * 10 + number % 10;
      number = number / 10;
   }
```

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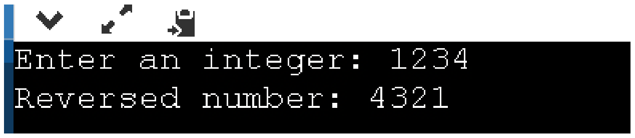
```
    // Display the reversed number
    printf("Reversed number: %d\n", reversedNumber);

    return 0;
}
```

OUTPUT:



```
Enter an integer: 1234
Reversed number: 4321
```

b) Write a program to add two 3×3 matrices. Display the addition.

```
#include <stdio.h>

int main() {
    int matrix1[3][3], matrix2[3][3], sumMatrix[3][3];

    // Input elements of the first matrix
    printf("Enter elements of matrix1:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            scanf("%d", &matrix1[i][j]);
        }
    }

    // Input elements of the second matrix
    printf("Enter elements of matrix2:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            scanf("%d", &matrix2[i][j]);
        }
    }

    // Add the matrices
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
```

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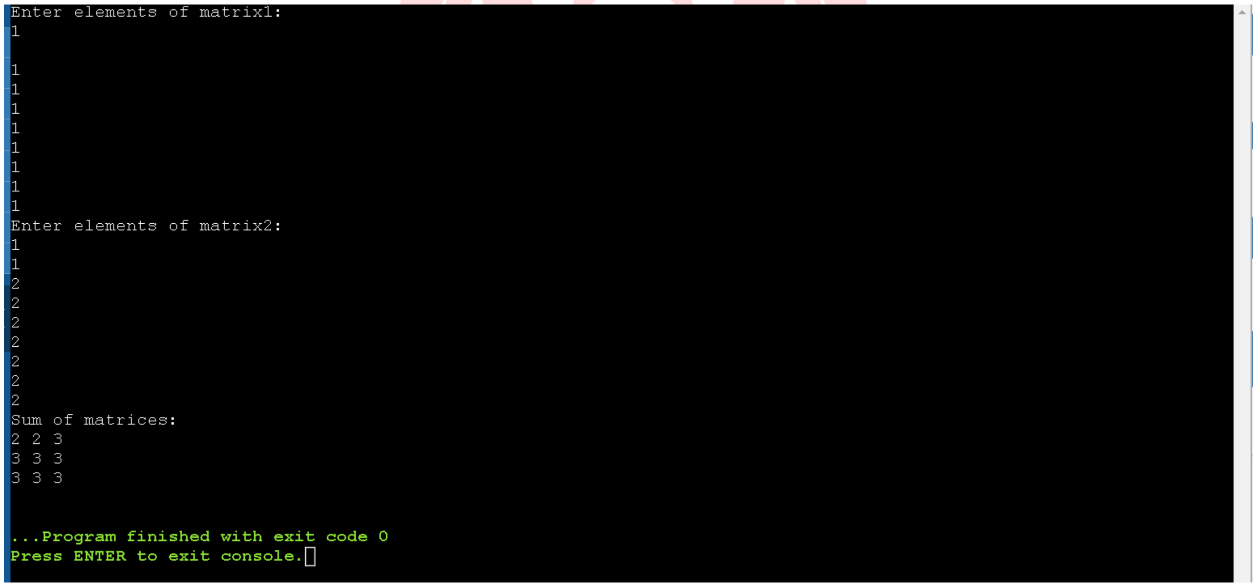
```
            sumMatrix[i][j] = matrix1[i][j] + matrix2[i][j];
        }
    }

    // Display the result
    printf("Sum of matrices:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 3; j++) {
            printf("%d ", sumMatrix[i][j]);
        }
        printf("\n");
    }

    return 0;
}
```

OUTPUT:



```
Enter elements of matrix1:
1

1
1
1
1
1
1
1
1
Enter elements of matrix2:
1
1
2
2
2
2
2
2
2
Sum of matrices:
2 2 3
3 3 3
3 3 3


...Program finished with exit code 0
Press ENTER to exit console.
```

c) Write a program to find largest number from an array using pointer.

```
#include <stdio.h>
```

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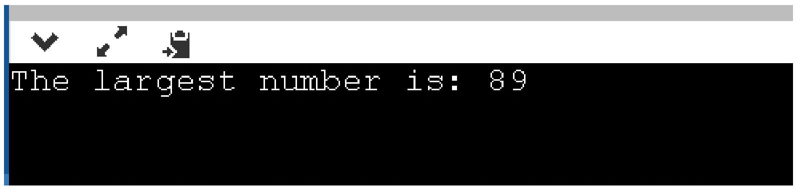
```
// Function to find the largest number in an array using pointer
int findLargest(int *arr, int size) {
    int *ptr = arr;
    int largest = *ptr;

    for (int i = 1; i < size; i++) {
        if (*(ptr + i) > largest) {
            largest = *(ptr + i);
        }
    }

    return largest;
}

int main() {
    int numbers[] = {23, 45, 12, 67, 89, 54, 32};
    int size = sizeof(numbers) / sizeof(numbers[0]);

    // Call the function to find the largest number
    int result = findLargest(numbers, size);

    // Display the result
    printf("The largest number is: %d\n", result);

    return 0;
}
```

OUTPUT:



```
The largest number is: 89
```

d) Write a C program to declare structure employee having data member name, age, designation and salary. Accept and display information of 1 employee.

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```c
#include <stdio.h>

// Declare structure for employee
struct Employee {
   char name[50];
   int age;
   char designation[50];
   float salary;
};

int main() {
   // Declare an instance of the Employee structure
   struct Employee emp;

   // Input employee information
   printf("Enter employee information:\n");
   printf("Name: ");
   scanf("%s", emp.name);
   printf("Age: ");
   scanf("%d", &emp.age);
   printf("Designation: ");
   scanf("%s", emp.designation);
   printf("Salary: ");
   scanf("%f", &emp.salary);

   // Display employee information
   printf("\nEmployee Information:\n");
   printf("Name: %s\n", emp.name);
   printf("Age: %d\n", emp.age);
   printf("Designation: %s\n", emp.designation);
   printf("Salary: %.2f\n", emp.salary);

   return 0;
}
```

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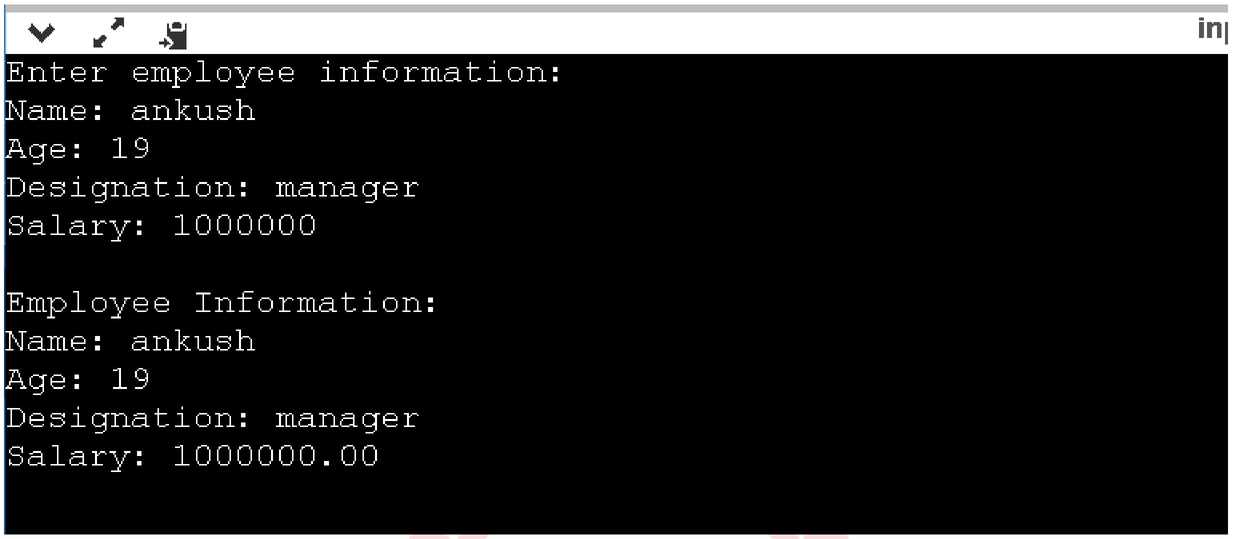
OUTPUT:


```
Enter employee information:
Name: ankush
Age: 19
Designation: manager
Salary: 1000000

Employee Information:
Name: ankush
Age: 19
Designation: manager
Salary: 1000000.00
```

e) Write a program to find factorial of a number using recursion.

```
#include <stdio.h>

// Recursive function to find factorial
int factorial(int n) {
    if (n == 0 || n == 1) {
        return 1;
    } else {
        return n * factorial(n - 1);
    }
}

int main() {
    int num;

    // Input a number
    printf("Enter a non-negative integer: ");
    scanf("%d", &num);
```

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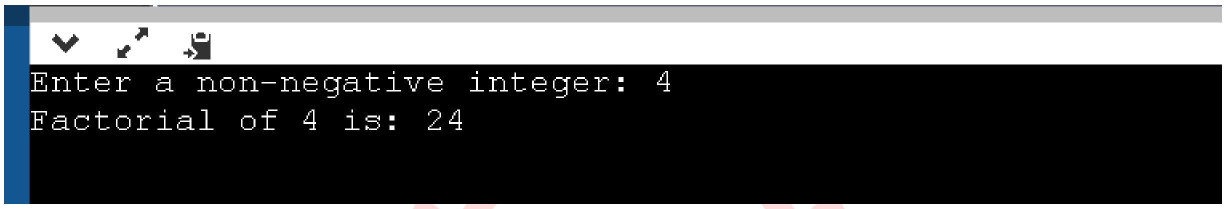
```
    // Call the recursive function to find factorial
    int result = factorial(num);

    // Display the result
    printf("Factorial of %d is: %d\n", num, result);

    return 0;
}
```

OUTPUT:



```
Enter a non-negative integer: 4
Factorial of 4 is: 24
```

f) Write a C program using pointer to read an array of characters and print them in reverse order.

```
#include <stdio.h>

int main() {
    char array[50];

    // Input an array of characters
    printf("Enter a string: ");
    scanf("%s", array);

    // Use pointer to print the array in reverse order
    char *ptr = array;
    printf("Reversed string: ");
    while (*ptr != '\0') {
        ptr++;
    }
    while (ptr != array) {
        ptr--;
        printf("%c", *ptr);
    }
    printf("\n");
```

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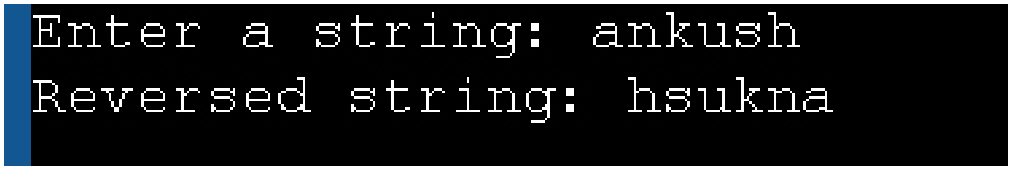
```
    return 0;
}
```

OUTPUT:



```
Enter a string: ankush
Reversed string: hsukna
```

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