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Lt. Shree Chimanbhai Shukla

B.C.A. - SEM-1- PROGRAMMING IN C

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CS-02: PROBLEM SOLVING METHODOLOGIS AND PROGRAMMING IN C

B.C.A. - SEMESTER – 1

Unit No.	Topic	Detail

1	**Introduction of C Language**	❖ Introduction of Computer Languages
		 ❖ Introduction of Programming Concept
		 ❖ Introduction of C Language (History & Overview)
		 ❖ Difference between traditional and modern c.
		 ❖ C character set
		 ❖ C tokens
		     o Keywords
		     o Constants
		     o Strings
		     o Identifiers and variables
		     o Operators (all 8 operators)
		 ❖ Hierarchy of operators
		 ❖ Type casting
		 ❖ Data types in c
		 ❖ PRE-PROCESSORS IN C

	Introduction of Logic Development Tools	❖ Introduction of Logic. ❖ Necessary Instructions for Developing Logic ❖ Basics of Flow Chart ❖ Dry-run and its Use. ❖ Other Logic development techniques

2	**Control Structures**	❖ Selective control structure
		     o If statements
		     o Switch statement
		 ❖ Conditional ternary operator
		 ❖ Iterative (looping) control statements
		     o For loop
		     o Do…while loop
		     o While loop
		 ❖ Nesting of loops
		 ❖ Jumping statements
		     o Break statement ,
		     o Continue statement

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		o Goto statements

3	**Functions (Inbuilt & User Defined)**	❖ Types of library functions
		   o String Function: Strcpy, strncpy, strcat, strncat, strchr, strrchr, strcmp, strncmp, strspn, strcspn, strlen, strpbrk, strstr, strtok
		   o Mathematical Functions: Acos, asin, atan, ceil, cos,
		   o div, exp, fabs, floor, fmod, log, modf, pow, sin, sqrt
		❖ Date & Time Functions: clock, difftime, mktime, time, asctime, ctime, gmtime, localtime, strftime
		❖ I/O Formatting Functions: printf, scanf, getc, getchar, gets, putc, putchar, puts, ungetc
		❖ Miscellaneous Functions: delay, clrscr, clearer, errno, isalnum, isalpha, iscntrl, isdigit, isgraph, islower, isprint, isspace, isupper, isxdigit, toupper, tolower
		❖ Standard Library functions: abs , atof , atol , exit , free, labs , qsort , rand , strtoul , srand
		❖ Memory Allocation Functions: malloc , realloc , calloc
		❖ Types of user defined functions
		❖ Pointers
		❖ Function call by value
		❖ Function call by reference
		❖ Recursion
		❖ Storage classes
		   o Passing and returning values

4	**Array**	❖ Types of arrays
		   o Single dimensional array
		   o Two dimensional array
		   o Multi-dimensional array
		   o String arrays
		❖ Use of Arrays in Programming
		❖ Arrays and Matrices

	Pointers	❖ Introduction of Pointers ❖ Use of pointers in Dynamic Programming ❖ Pointer to Variables ❖ Pointer to Array ❖ Pointer within Array ❖ Pointer To Structure

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		❖ Pointers within structure ❖ Pointer to Pointer
5	**User Defined Data Type – Structure , Union & Enum**	❖ What is structure ❖ Initializations and declarations ❖ Memory allocation functions ❖ Pointers with structures ❖ Array with structures ❖ Udf with structures ❖ Nested structures ❖ Introduction to union ❖ Difference between Structure & Union
	File Handling	❖ Concept of data files ❖ File handling ❖ Use of file handling functions ❖ fopen, fclose, fprintf, fscanf, getw, putw, fseek, ❖ ftell, rewind ,freopen, remove, rename, feof, ferror, fflush, fgetpos, sprintf, snprintf, vsprintf, vsnprintf, fscanf, vfscanf,setbuf, setvbuf ❖ I/O operations ❖ Command line arguments

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CHAPTER-1

INTRODUCTION OF C LANUGAGE &
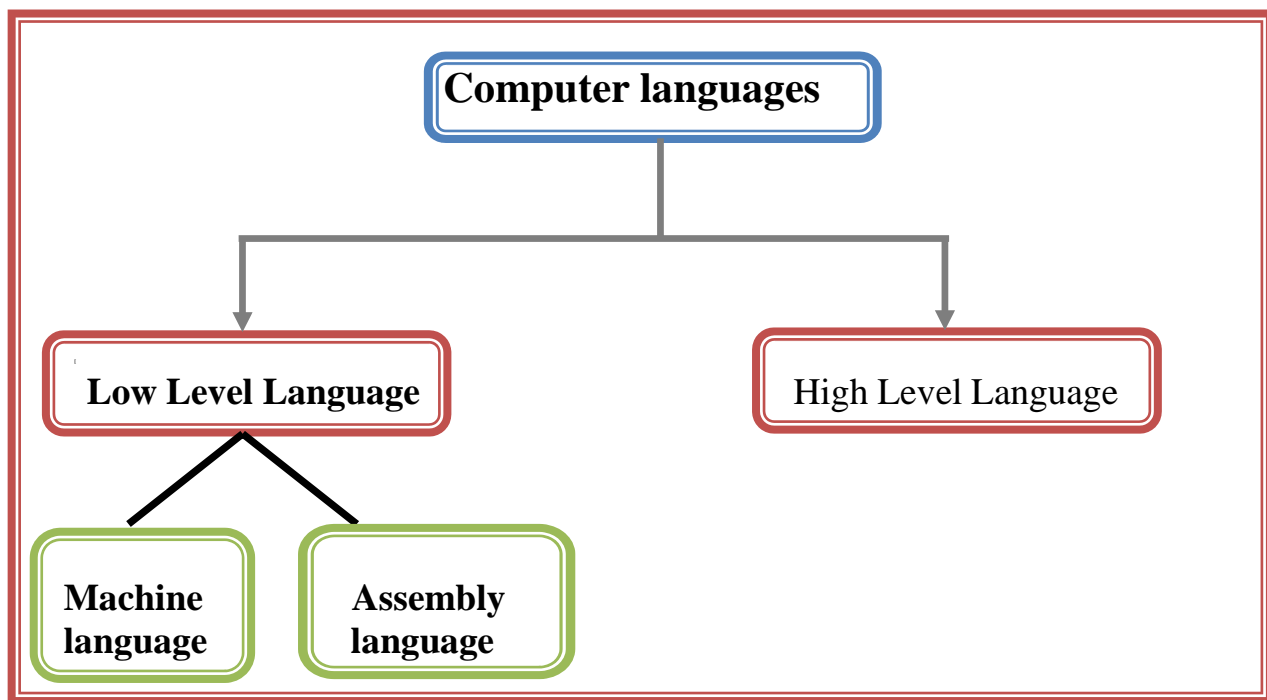
INTRODUCTION OF LOGIC DEVELOPMENT TOOLS

o   Introduction of computer languages.

o   Introduction of programming concept.

o   Introduction of C language (History and Overview).

o   Difference between traditional and modern C.

o   C character set.

o   C tokens.

- Keywords
- Constants
- Strings
- Identifiers and variables
-   Operators (all 8 operators)

o   Hierarchy of operators

o   Type casting

o   Data types in C

o   Pre-Processors in C

o   Introduction of Logic.

o   Necessary Instructions for Developing Logic

o   Basics of Flow Chart

o   Dry-run and its Use.

o   Other Logic development techniques

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Q-1 Introduction of computer languages:

```
                    Computer languages


        Low Level Language              High Level Language


    Machine       Assembly
    language      language
```

Detail :-

❖ Computer languages are divided into two categories:

  ❖ Low Level Languages
  ❖ High Level Languages

❖ Low level languages can be of two types:

  2.1 Machine language
  2.2 Assembly language.

1. Machine language programming:

Machine language is written using Binary Language (0 & 1).
Computer can understand only low level language.
So that computer need to convert it.

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Advantages of Machine language programming:

It does not need to convert.

It need less memory.

Programs are small & easy.

Disadvantages of Machine language programming:

The programs are difficult to understand and debug.

Programs are not portable.

Programs are hard to describe.

2. Assembly language:

Assembly language is written using set of instructions.

We need assembler to convert the code.

Advantages of Assembly language:

The programs are easy to understand.

Instructions can be written using set of code.

It need less time to represent.

Disadvantages of Assembly language:

We need assembler to translate the code.

Programs are not portable.

3. High Level Languages or problem oriented languages:

High level languages are written using English Statements.

Computer have to convert high level language into low level language.

Advantages of High level language :

Programs are portable.

Programs are easy to understand.

We need less time to write the programs.

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Disadvantages of High level language :

It require more memory.

We need translator to convert the code.

It is compulsory to understand structure of program.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	How Many Types of Computer Languages Available?	2(Two)
2	Machine Language can be written using	0 and 1 (Binary)
3	_____ is used to convert Assembly Language into Machine Language	Assembler
4	High Level Languages are written using _____	English Statements
5	_____ is used to convert High Level Language into Machine Language	Interpreter or Compiler
6	_____ Language is not suitable for Large Application	Machine Language
7	Low Level Languages are further divide into_____ and _____	Machine Level Assembly

Q-2 History of C Language :

DEVELOPER OF C LANGUAGE ⟹ **DENNIS M. RITCHIE**

DEVELOPING YEAR ⟹ **1972**

DEVELOPED AT ⟹ **AT & T'S BELL LAB.**

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Detail :-

- ❖ C is one type of Programming Language.
- ❖ It was developed at "AT & T's Bell Laboratories".
- ❖ Dennis.M.Ritchie was the founder or father of C Language.
- ❖ In 1960 , There were many languages available but only for some specific purpose.

       For Example :- COBOL

- ❖ COBOL was used for commercial applications.

SR NO	YEAR	LANGUAGE	DEVELOPER
1	1960	ALGOL	INTERNATIONAL COMMITTEE
2	1963	CPL	CAMBRIDGE UNIVERSITY
3	1967	BPCL	MARTIN RICHARDS & CAMBRIDGE UNIVERSITY
4	1970	B	KENT THOMPSON AT AT & T LABORATORY
5	1972	C	DENIS RITHCHIE AT AT & T LABORATORIES
6	1978	K&R C	Kernighan and Ritchie
7	1989	ANSI C	ANSI Committee
8	1990	ISO C	ISO Committee

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❖ At that time people decided to develop particular language that is used for all purpose.

❖ There are following languages available at that time for different types of use.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Who is Founder of C Language?	Dennis M.Ritchie
2	In Which year C Language was developed?	1972
3	Where C Language was developed?	At & T's Bell Laboratories
4	C Language is rich set of_____	Built – in Functions &Operators

Q-3 Character Set of C Language :
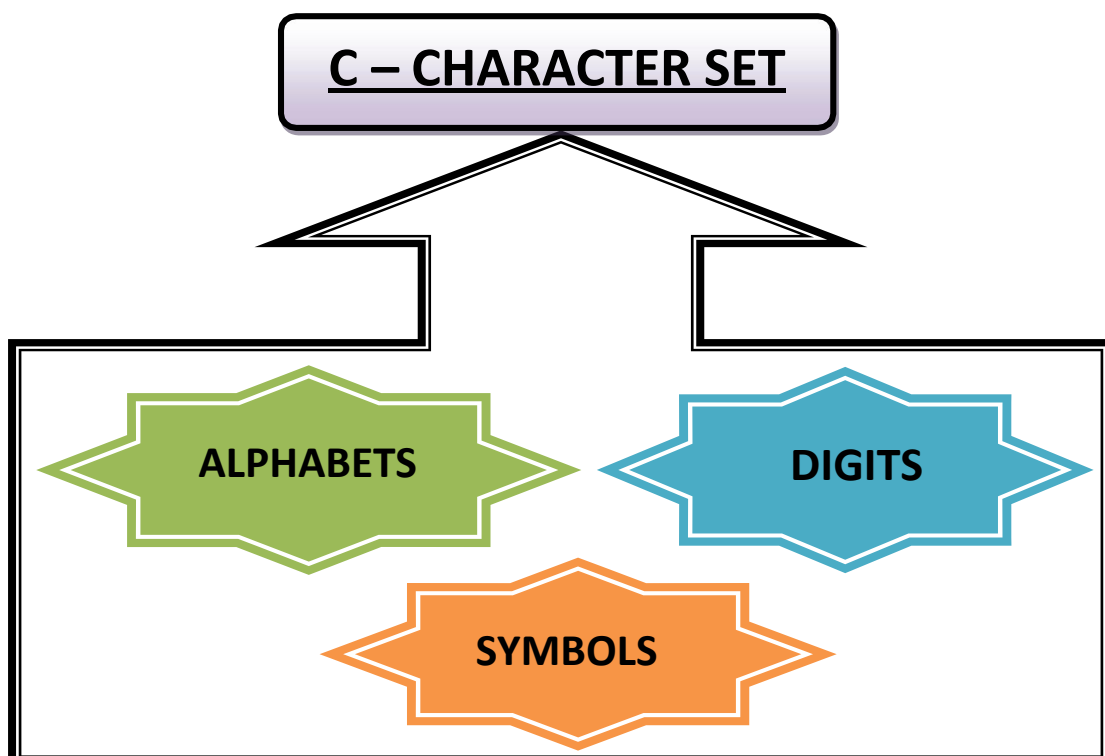
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Detail :-

❖ The Character set in c language always used to represent the information.

❖ The Character set in c language support unique value for each character.

❖ The Character set in c language also include white space character.

❖ The C Character set include mainly the following:

> **(i)Alphabets**
>
> **(ii)Digits**
>
> **(iii)Symbols**

Alphabets :-

❖ C language support different alphabets which can be A to Z (in capital letters) and a to z (in small letters).

Digits :-

❖ In C language we can input sequence of numbers which can be between 0 to 9.

Symbols :-

❖ We can also input some special symbols as information in Clanguage. The different symbols can have different meanings.

• Special Symbols:

Symbol	Meaning
+	Plus sign
|	Vertical bar
\	Backslash
'	Apostrophe
-	Minus sign
=	Equal to sign
{	Left brace
}	Right brace
[	Left bracket
]	Right bracket

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1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Character Set includes mainly_____ , _____&_____	Alphabets , Digits &Symbols
2	Digits include mainly _____	0 to 9
3	Alphabets include mainly_____	A to Z and a to z
4	Is White Space a Character?(Yes/No)	Yes

Q-4 What is Token ? Explain different Tokens of C.

Detail :-

- ❖ In a C program, the smallest individual unit is known as C tokens.
- ❖ A token is a source program text which compiler does not break into furtherelements.
- ❖ This basic elements recognized by compilers are known as "tokens".
- ❖ Tokens are further classified into keywords, constants, strings, operatorsand special symbols.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Smallest individual units in c language is called?	Token
2	Tokens must be recognized by _____	Compiler

4.1 Keywords :-

Detail :-

- ❖ Predefined Words or Reserve Words are known as keywords.
- ❖ We cannot change the meaning of keywords.

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- ❖ All keywords must be written in Lowercase.
- ❖ Keywords serve as basic building blocks for program statements.
- ❖ Keywords are the words that have specific meaning and this meaning has already been explained to compiler.

There are 32 keywords available in C language.

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
char	extern	return	union
continue	for	signed	void
do	if	static	while
default	goto	sizeof	Volatile
const	float	short	Unsigned

1 Word Question – Answer

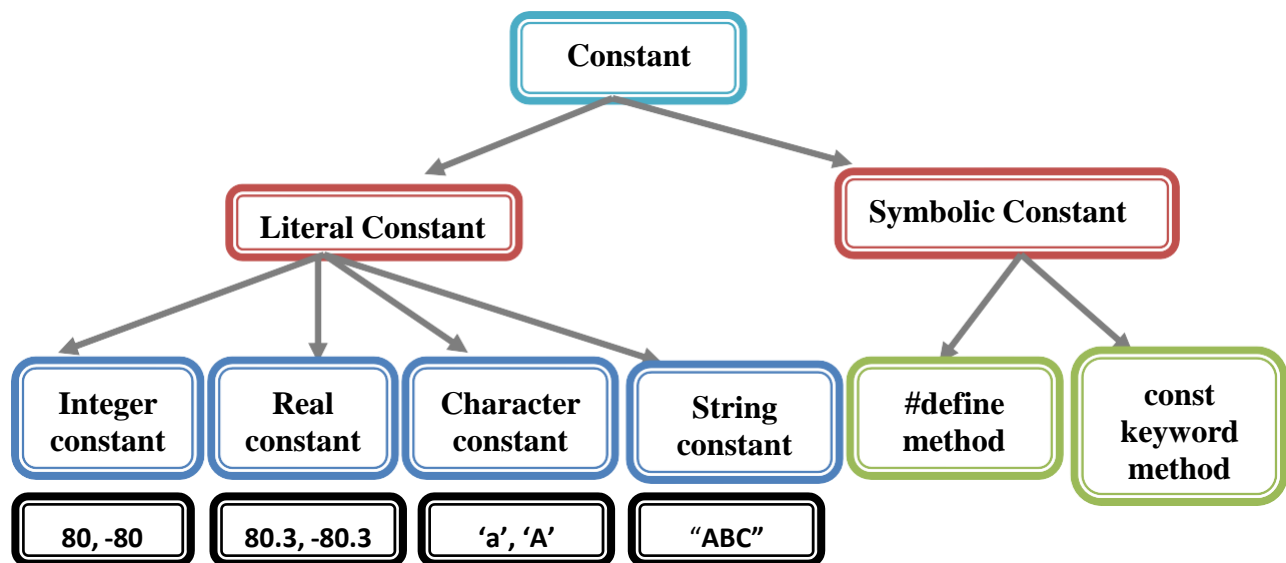| SR.NO.	QUESTION	ANSWER
1	Keyword Means	Reserve Words
2	How many keywords available in c?	32
3	Can we use keyword as variable name?(Yes/No)	No

4.2 Constants :

- ❖ Constant means the fixed value.The value of constant can not be changed during execution of program.
- ❖ There are two types of constant available in c.

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```
                          Constant

         Literal Constant            Symbolic Constant

  Integer    Real    Character   String    #define    const
  constant  constant  constant   constant   method   keyword
                                                      method

  80, -80  80.3, -80.3  'a', 'A'   "ABC"
```

Literal Constant:

❖ Literal constant is the value that is typed directly into your program wherever it is needed.

❖ Literal constant is divided further into 4 categories that is;

- integer constant,
- real constant,
- character constant,
- string constant.

Symbolic Constant:

❖ A symbolic constant is a constant that is represented by name, just as a variable is represented.

❖ The real value of symbolic constant must be entered only once when it is fist defined.

❖ C language has two methods of defining symbolic constant.

- **#define method:**

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❖ #define directive is one of C language preprocessor directive.

❖ There is no '=' sign while assigning a value to the variable while using #define.

Example: #define pi 3.14

#define X "hello hw r u"

• **const keyword method:**

❖ Const keyword is used for variable declaration.

❖ To declare any variable using const keyword we can use equalsign (=). **Example:** const x=5.5

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Constant Means	"fixed Value"
2	Value of Constant can never change during execution of program?(True/False)	True
3	Types of Constant	2(two) Literal and Symbolic
4	Is following declaration true in case of literal constant ? Ex :- int i=90;	True
5	Symbolic constant can be represented by either _____method or_____keyword.	#define or Const
6	Write down statement to declare symbolic constant like pi=3.14 using define method.	#define pi 3.14

4.3 Strings:
Detail :-

❖ In C language "bunch of characters " is called string.

❖ In C language string can be represented by double quotes ("   ").

❖ To indicate end of the string '\0' (NULL) character can be used.

❖ C will automatically created array of characters.

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❖ Each character in the array will occupies 1 byte in the memory.
❖ In C language we can declare string value like following :-
> **Example:** char string[]="hello".

h	e	l	l	o

2000 2001   2002   2003   2004

❖ While entering the string using scanf() following points should be keptin mind:

❖ The length of string can not be more than size of characterarray.

❖ The string can be fixed or dynamic.

1 Word Question – Answer

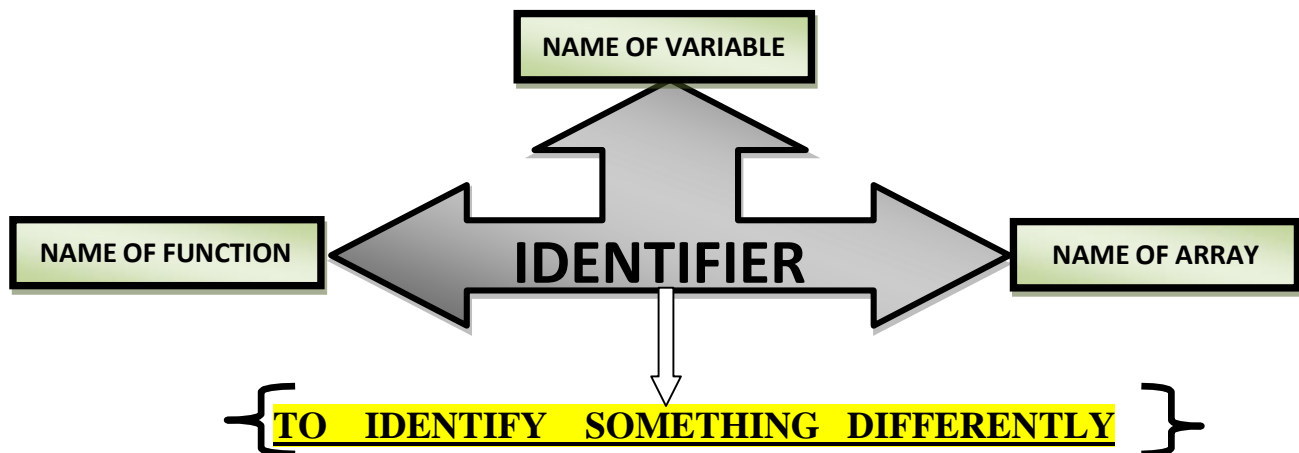| SR.NO.	QUESTION	ANSWER
1	String Means_____	"Array of Characters"
2	End of string can be represented by special character called????	Null character('\0')
3	In c language , string can be denoted by????	Double Quotes(" ")
4	Each character in String Array can occupy _____byte in memory.	One byte
5	How to declare String Array or Character Array?	Char a[ ] = "hello";

4.4 Identifiers and variables:

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NAME OF VARIABLE

NAME OF FUNCTION

IDENTIFIER

NAME OF ARRAY

TO IDENTIFY SOMETHING DIFFERENTLY

Detail :-

- ❖ Identifier is used to indicate name of variable , function and array.
- ❖ Variable is one type of identifier that used to store some value.
- ❖ Variable or Identifier can support different values of different types.
- ❖ Identifier can be recongnized by user defined name.
- ❖ There are some rules for declaring variable or identifier.

Namig Rules for identifiers:

- ✓ First character must be an alphabet.
- ✓ Identifier Must contains letters, digits and underscore.
- ✓ Identifier name can be maximum of 31 characters.
- ✓ Keyword can not be used as variable name.
- ✓ White space does not allow as variable name.

Example:

int age = 20;

Note :- Here , age is identifier

1 Word Question – Answer

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SR.NO.	QUESTION	ANSWER
1	Identifier Means	"To Identify Something"
2	Identifier Consist of_____ &_____	Letters & digits
3	Identifier must not contains_____	White Space
4	Only Permitted symbol in identifier is_____	Underscore(_)

Variables:

Detail :-
- ❖ Variables is a container that used to store data or value.
- ❖ A variable may take different values at different times during execution.
- ❖ All the variables have three basic attributes:
  - • Name
  - • Value
  - • Address of memory location, where the value is stored.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Variable is used to store different types of ____	values
2	Variable can store on different _____	Memory Location
3	Variable can have _____	Unique Address

4.5 Operators:

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Operator means to "Operate something".

Operator can have different Operand or Values

Detail :-

❖ Operators are used to indicate some operations on different values.

❖ Operator means to perform some operations on the data or values.

❖ C Languagesupport mainly the following operators…

- ▪ Arithmetic Operator
- ▪ Relational Operator
- ▪ Logical Operator
- ▪ Assignment Operator
- ▪ Bitwise Operator
- ▪ Conditional Operator
- ▪ Special Operator
- ▪ Increment / Decrement Operator

Arithmetic Operator :-

❖ The Arithmetic operator s are used to perform some operations on the value.

❖ There are following arithmetic operator available in c.

Operators	Meaning
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulus

Relational Operator :-

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❖ Relatioal operators are also known as comparison operators.

❖ It returns only one output at a time.

❖ There are following relational operators available in c.

Operators	Meaning
>	Greater than
<	Less than
>=	Greater than & Equal to
<=	Less than & Equal to
==	Equal to
!=	Not Equal to

Logical Operator :-

❖ The logical operators are operators that return only one output at a time , that is true or false.

❖ There are following logical operator abailable in c.

Operators	Meaning
&&	Logical AND
||	Logical OR
!	Logical NOT

Assignment Operator :-

❖ The assignment operator is used to assign value to the variable.

❖ There is only one assignment operator available in c that is
=(Equalto)
Example :- int i=10;

Bitwise Operator :-

❖ Bitwise operator is used to store the data at bit level.

❖ The following are bitwise operators supported by C language.

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Operators	Meaning
&	Bitwise AND
|	Bitwise OR
^	Bitwise Exclusive
<<	Shift Left
>>	Shift Right
~	One's Complement

Conditional Operator :-

❖ Conditional Operators are also known as ternary operators.

❖ There are only two contional operators available in c.

Operators	Meaning
?	Questiona Mark (True)
:	Colon (False)

Example :- (a>b) ? Printf("a is max") : ("b is max")

Special Operator :-

❖ The special operators in c language are used for some special purpose.

❖ There are following special operators available in c.

Comma Operator :- This operator is used to combine valuewith variable.

EX :- printf("a=%d",a);

Sizeof Operator :- This operator is used to find out howmany bytes ,value or variable can occupies.

EX :- sizeof(12);

Increment / Decrement Operator :-

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❖ The increment operator is used to increase the value and decrement operator is used to decrease the value.

❖ In C Language , ++ is called increment operator and - - is called decrement operator.

Operators	Meaning
++a	**Prefix increment**
a++	**Postfix increment**
--a	**Prefix decrement**
a--	**Postfix decrement**

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Conditional Operator in c language can be ____ and ____	? and :
2	_____ operator can find how many bytes an operand can occupies	Sizeof
3	_____ operator can used to link related expression together.	Comma
4	_____ operator is known as assignment operator	=(equal to)
5	If condition is false , logical operator can return	0
6	Precedence of operator is known as _____	Hierarchy

Q-5 Hierarchy of operators:

Hierarchy   means   "Precedence "

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Hierarchy means "Precedence of Operators"
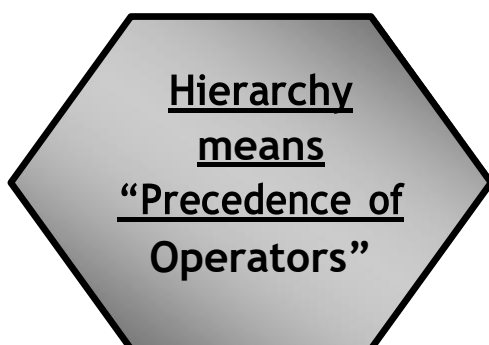
The operators that having same precedence is called associativity

Detail :-

- ❖ In C Language there are variety of operators.
- ❖ In C Language each operator having priority of operating.
- ❖ There can be low level and high level priority.
- ❖ High level operator will be execute first and low level operators will be execute last.
- ❖ The priority rules can be different for different operators.

Sr. No.	Operator	Meaning	Priority
1	( ) , [ ]	**Function Brackets**	1
2	/ , *	**Division , Multiplication**	2
3	%	**Modulus**	3
4	+ , -	**Addition , Subtraction**	4
5	<< , >>	**Shilf left , Shift Right**	5
6	> ,<,= =,!=	**Relational Operator**	6

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7	=	Assignment Operator	7
8	&& , || , !	Logical Operator	8

❖ The hierarchy of operators are as follow.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	The Precedence of operator is called?	Hierarchy
2	Associativity rules are applied when operators have _____	Same level
3	Operators of the same precedence can be evaluated from_____as well as from _____	Left to RightRight to Left

Q-6 Type Casting (Type Conversion) :

TYPE CASTING MEANS ⟹ **"DATA TYPE CONVERSION"**

"Converting data from one datatype to another"
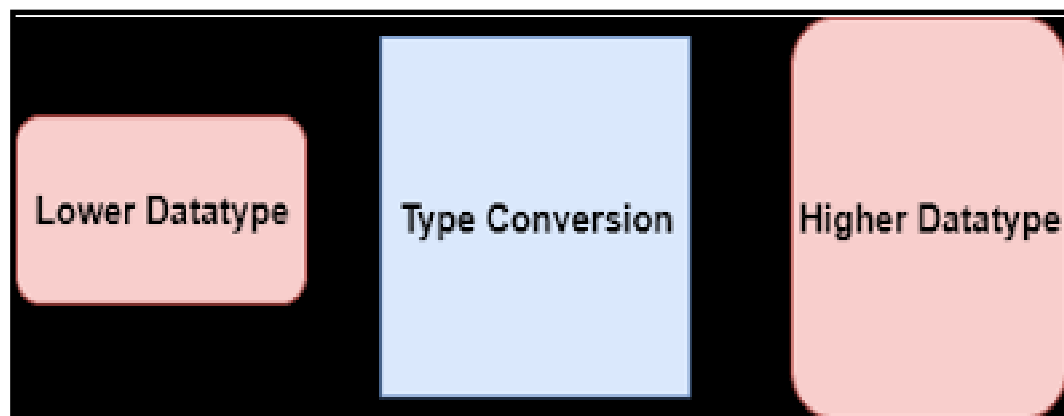
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Detail :-

❖ Type Casting is process of converting one data type into other data type.
❖ There are two types of type casting available.

Implicit	Explicit (Using
(Automatic Type	type cast operator)
Conversion)	

Type Casting

Implicit Type   **Explicit Type**
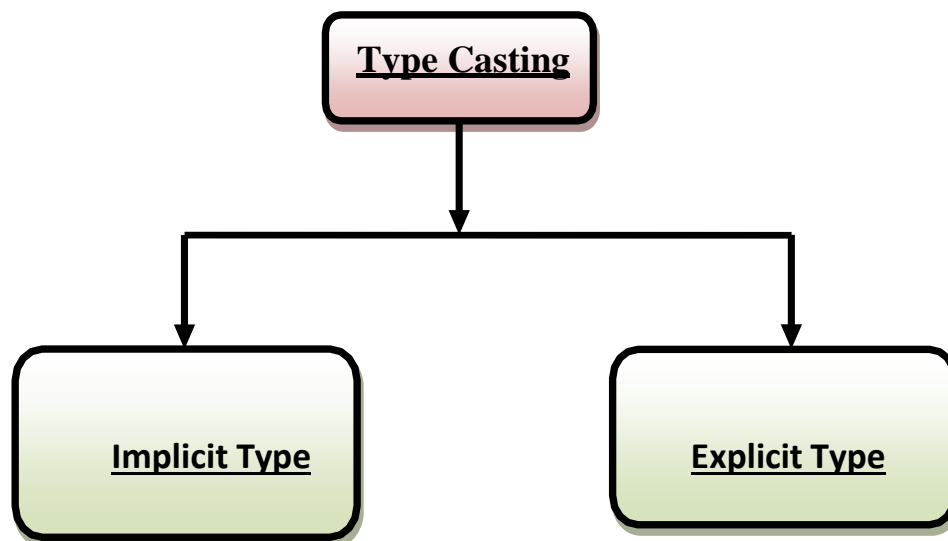
Implicit Type Conversion :
❖ The implicit type casing is also known as automatic conversion.
❖ The implicit conversion is used to convert original data type intoother data type.
❖ In this type of casting data should be converted from smaller datatype to larger data type.

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Conversion Hierachy

Long double
Double
Float
Unsigned long int
Long int
Unsigned int
Int

Short	char
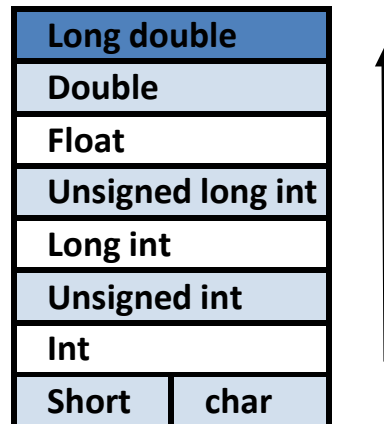
Explicit Type Conversion :

- ❖ Sometimes we have to convert different datatype into single datatype.
- ❖ But Explictit casting is not automatic conversion because we have to use type cast operator.
- ❖ We can change type of the data from smaller to larger and larger to smaller.

  Ex :- b = (float) a;

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Type casting also known as _____	Type Conversion
2	Type casting can be of _____ & _____ types	Implicit & Explicit
3	Implicti Conversion also known as _____	Automatic Conversion
4	In Explicit Conversion , we have to use _____ operator to perform type casting	Type Cast

Q-7 Data types in C:

Data Type Means :- "Type of Data that you want to store"

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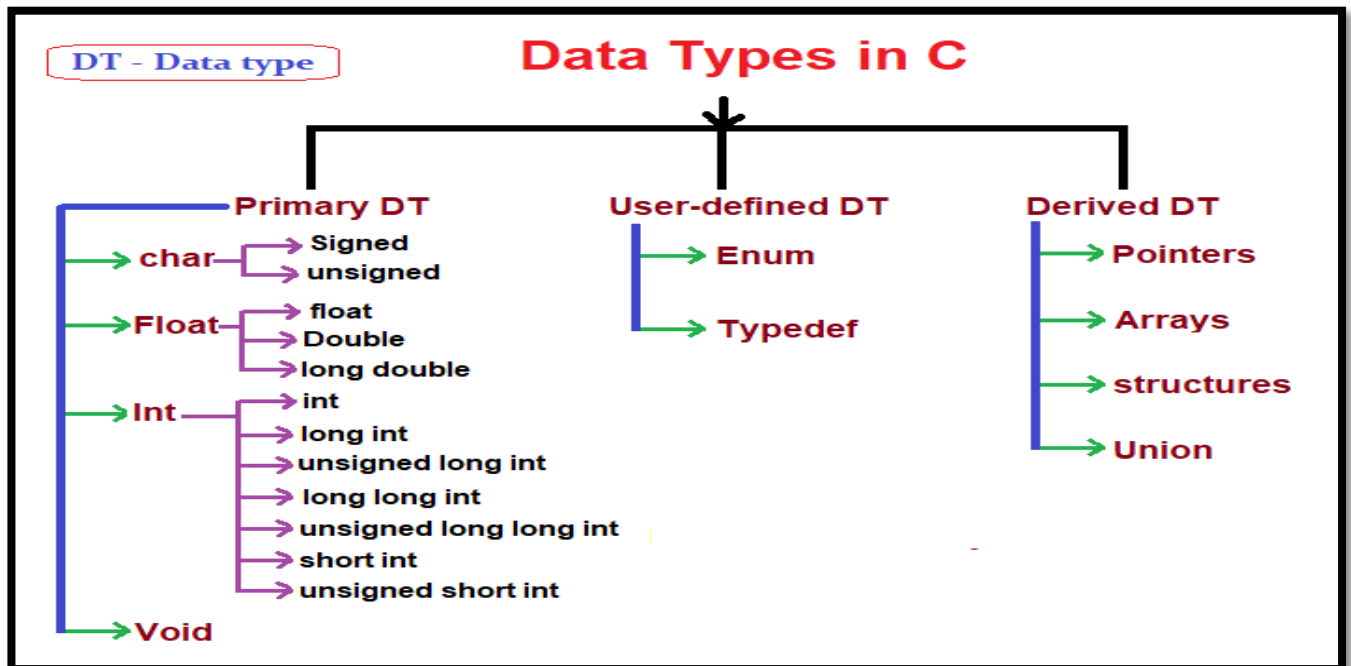
Detail :-

❖ Data types are used to store different types of values in variable.
❖ In C language , there are three types of data types available.

✓ Primary/ Basic/ Fundamental Data types. (Integer, Character, Float, void)
✓ Derived Data types. (Array, Pointer)
✓ User Define Data types. (Structure, Union, enum, typedef)

Primary Data Type :

❖ The primary data types are also called fundamental or built-in orbasic data types.
❖ The primary data types include mainly following :

1 Integer :-

This data type is used to store only integer value.
It occupies 2 bytes of memory.

2 Float :- (Long)

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This data type is used to store integer value & Decimal Value.
It occupies 4 bytes of memory.

3 Char :-
This data type is used to store single or multiple characters.
It occupies 1 byte of memory.

4 Double :-
This data type is used to store integer and decimal values.
It occupies 8 bytes of memory.

5 long double :-
This data type is used to store integer and decimal values
with highrange.
It occupies 10 bytes of memory.

User Defined Data Type :
❖ User defined data type is a type of data that decided by userself.
❖ User defined data type include mainly the following.

✓ Typedef :-
❖ It provide facility to represent identifier of particular data type.

✓ Enum :-
❖ It provide facility to declare multiple constant at the same time.

✓ Structure:-
❖ It is used to create member of different data type at the same time.

✓ Union:-
❖ It is used to create member of different data type at the same time.

SR.	DATA	MEMORY	RANGE

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<u>NO.</u>	<u>TYPE</u>	<u>SIZE</u>	
<u>1</u>	Char	1 Byte	-128 to +127
<u>2</u>	Int	2 Byte	-32768 to +32767
<u>3</u>	Long	4 Byte	-2,147,483,648 to +2,147,483,647
<u>4</u>	Float	4 Byte	1.2 e -38 to 3.4 e +308
<u>5</u>	Double	8 Byte	2.3 e -308 to 1.7 e +308
<u>6</u>	Long Double	10 Bytes	3.4 e -4932 to 1.1 e +4932

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Data types are used to decide type of	Data or Value
2	C Language support _____ , _____ & _____ categories of Data Type.	Primary User defined Derived
3	Typedef means _____	Type Definition
4	List our User defined Data types in C.	Structure Union Enum
5	Integer datatype occupies _____ bytes ofMemory	2
6	Float datatype occupies _____ byptes ofMemory	4
7	Character Datatype occupies ____ byte ofMemory	1

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Q-8 Pre-Processor in C:-

Pre - Processor Directives in C:

Define
(To define constant value)# Include
(To include Files)
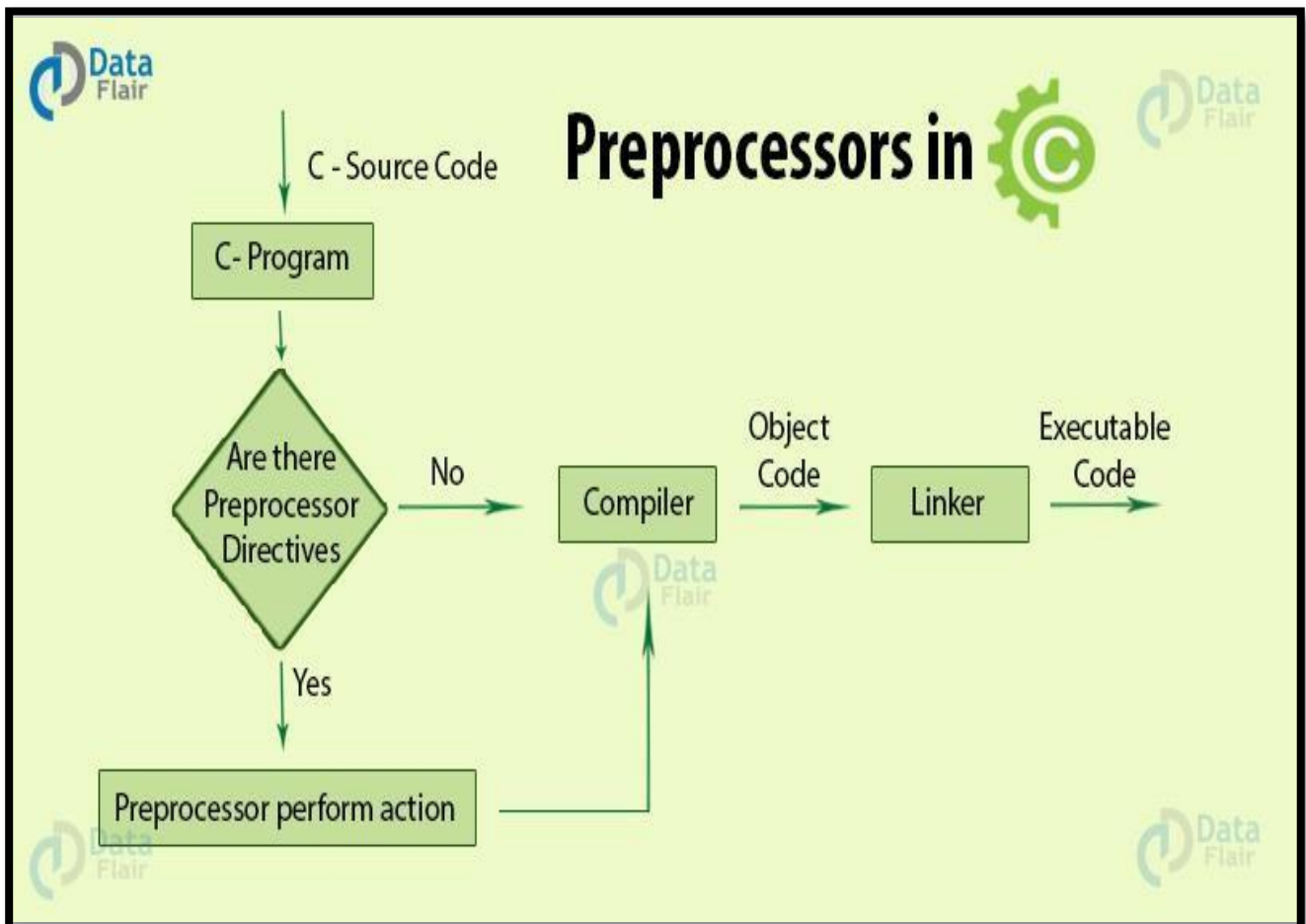
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Detail :-

- ❖ Pre – Processor directives are executed directly by compiler.
- ❖ Any pre-processor in C language always begins with #(Hash) Sign.
- ❖ C language support following pre-processor directives.

 # include :

- ▪ # include is pre-processor that use to include header files in ourprogram.
- ▪ If we not include particular header file then compiler give error relatedto "prototype".
- ▪ **Example :-** #include<stdio.h>

To declare any header file you have to use angular brackets (< >).

```
Hand written program
        │ Text editor
        ▼
C Source code (PR1.C)
        │ Preprocessor
        ▼
Expanded source code (PR1.I)
        │ Compiler
        ▼
Object code (PR1.OBJ)
        │ Linker
        ▼
Executable code (PR1.EXE)
```
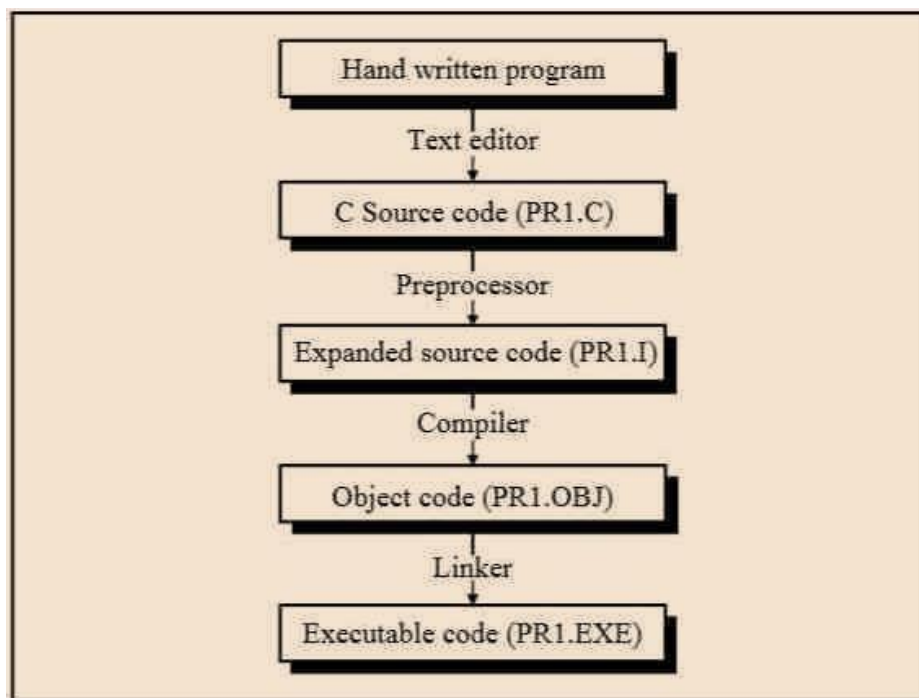
- ❖ **# define :**
  - ▪ # define pre – processor is used to create symbolic constant.

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- You can not change value of constant once it is defined.
- You can not re-define the value of constant using # define.
- **Example :-** # define pi 3.14
- **Note :-** If you use # define then statement will not ends with ;

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Pre-Processor of C language are :	# define , # include
2	Any pre-processor always begins with_____Sign	#(Hash)
3	_____Pre-Processor is used to add Header File.	# include
4	_____ Pre-Processor is used to declare any contant or fixed value.	# define

❖ INTRODUCTION OF LOGIC DEVELOPMENT TOOLS

WHAT IS LOGIC ??????

Logic is a tool to develop reasonable conclusions based on a given set of data. **OR**

"Way of thinking about something"
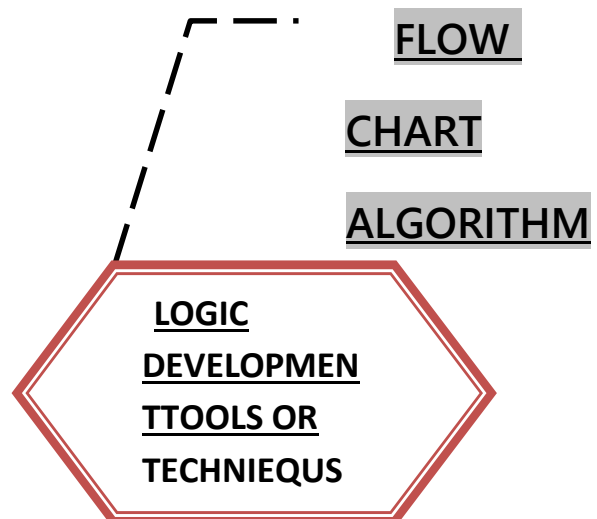
FLOW

CHART

ALGORITHM

LOGIC DEVELOPMENT TOOLS OR TECHNIEQUS

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Q-9 Basics of Flowchart:

Detail :-

Q   Flow chart is graphical representation of our data.

R   It also give idea about sequence of flow.

S   Flow chart can represent logic flow and process of data.

Flowchart Symbols:

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❖ Flow chart support following symbols to represent the logic.
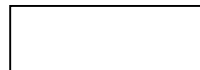
Terminator:
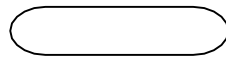
This symbol represents beginning and ending point in the program.
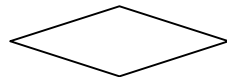
Input/Output :
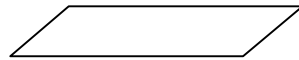
It is used to represent input and output of the data.
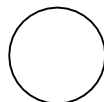
Process :

This symbol is used to represent different process of operations.
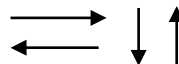
Decision Symbol:

This symbol is used to give condition and take decision.

Connector Symbol:

It is used to represent logic flow of out data.

Data Flow Symbol / Flow Direction:

It is used to represent direction flow of our data.

Advantages of flow chart :-
✓ Using flow chart we can easily understand logic of code.
✓ It represent clear view of the program.
✓ It represent graphical behavior of the data.

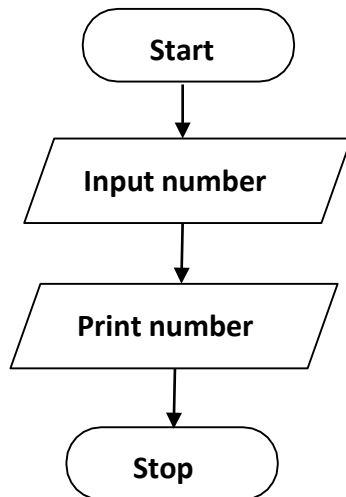**Example:**

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A flowchart to print the number.

Start

Input number

Print number

Stop

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	List out logic development tools or techniques	Flowchart ,Algorithm
2	_____ is graphical representation of the code.	Flow Chart
3	Which Symbol is used to represent process in Flow chart.	

Q-10 Explain Dry Run:

DRY RUN :

" PROCESS OF APPLYING PROGRAMMING LOGIC

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Detail :-

- ❖ Dry run is nothing but manual compilation of code.
- ❖ You can test your program without using a computer by *dry running* it onpaper.
- ❖ You act as the computer – following the instructions of the program,recording the valves of the variables at each stage.
- ❖ You can do this with a *table* .
- ❖ The table with have column headed with the names of the *variables* in theprogram.
- ❖ Each row in the table will be labelled with a line number form the program
- ❖ In this table you can record all relevant changes to the variables as theprogram progresses, thereby test the logic of the program / algorithm.
- ❖ Do a dry run before you code your program on computer this way any logicerrors will come to light during the dry run.

- ▪ **Example :-**

  - ▪ L1 Declare two variables , first num second num
  - ▪ L2 Initialise both variables to 0
  - ▪ L3 first num = 0 second num = 0
  - ▪ L4 Ask user to enter first number
  - ▪ L5 Assign user input to first num variable
  - ▪ L6 Ask user to enter second number
  - ▪ L7 Assign user input to second num variable
  - ▪ L8 Add first num to second num
  - ▪ L9 Print result

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER

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1	What is Dry run?	"Manual Compilation ofCode."
2	In Dry run , you can test your program by performing steps on paper.(Yes/No)	Yes

Q-11 Explain Algorithm.

ALGORITHM :-

" DETAIL SEQUENCE OF SIMPLE STEPS" OR"IT

CONSIST SET OF FINITE STEPS"

Characteristics of an Algorithm
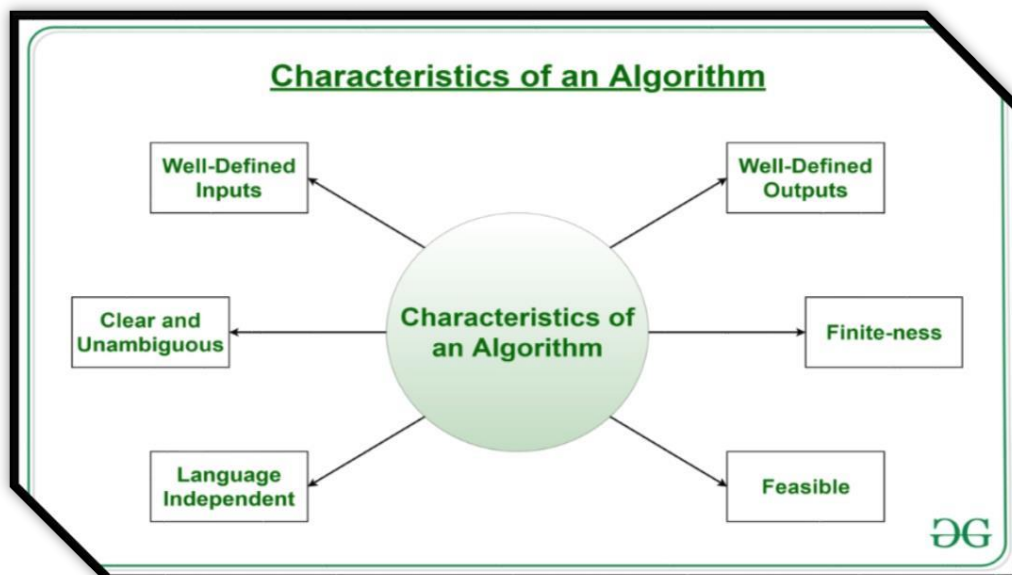
Detail :-

- Algorithm is one of the best logic development technique.
- It is detail sequence of solving the problem.

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- In algorithm we can manage input and output as well as any condition.

Features of Algorithm :-

a. Input :- There must be atleast one input.

b. Output :- There must be atleast one output.

c. Effectiveness :- Each step of algorithm must be effective.

Example: An algorithm for multiplication of two values.

Step 1: Start
Step 2: Input value -1
Step 3: Input value -2
Step 4:Calculate ans = value -1 * value -2Step
Step 5:Print ans
Step 6:Stop

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	What is Algorithm?	"sequence of simple steps"
2	Algorithm must_____after finite steps.	terminate

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SUMMARY QUESTIONS OF CHAPTER -1

ONE - MARK QUESTIONS

- ✓ Who is known as Father of C Language?
- ✓ How Many Keywords Available in C Language?
- ✓ What is Dry Run?
- ✓ List out Different Tokens.
- ✓ Character Set includes __, _____ & _____ .
- ✓ What is Variable?
- ✓ What is Constant?
- ✓ In C Language String can be represented by __.
- ✓ Integer Datatype Occupies __ Bytes in Memory.
- ✓ What is Use of SizeOf Operator?
- ✓ Conditional Operators are _____ & ___ .
- ✓ What is Signed Interger and What is Unsigned Integer?
- ✓ Void Datatype returns _____ .

TWO - MARK QUESTIONS

- ✓ Explain Pre-Processor in C.
- ✓ What is Type Casting?Explain with Types.
- ✓ List out different Advantages of FlowChart.
- ✓ Explain Keywords in Brief.
- ✓ Explain String with Example.
- ✓ Explain Different symbols of FlowChart.

THREE - MARK QUESTIONS

- ✓ Explain Hierarchy of Operators in C.
- ✓ Write down Algorithm for Swapping of Two Numbers.
- ✓ Write note on Structure of C Program.

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- ✓ Explain History of C Language.
- ✓ List out different Logic Development Tools/Techniques and
- ✓ Explain any one in brief.

FIVE - MARK QUESTIONS

- ✓ Explain DataTypes of C.
- ✓ Write note on Computer Languages.
- ✓ Give Difference between Assembly and Machine Level Language.
- ✓ Write note on different Operators available in C.

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CHAPTER-2

CONTROL STRUCTURES

- o Selective Control Structures

    - if statements
    - Switch statement

- o Conditional (ternary) Operator
- o Iterative (looping) control statements

    - For loop
    - Do…while loop
    - while loop

- o Nesting of loops
- o Jumping statements

    - Break statement
    - Continue Statement
    - Goto statement

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Q-1 What is Control Structure ? List out different control structure available in C.

Control Structure :- "It used to control Flow of the Program"
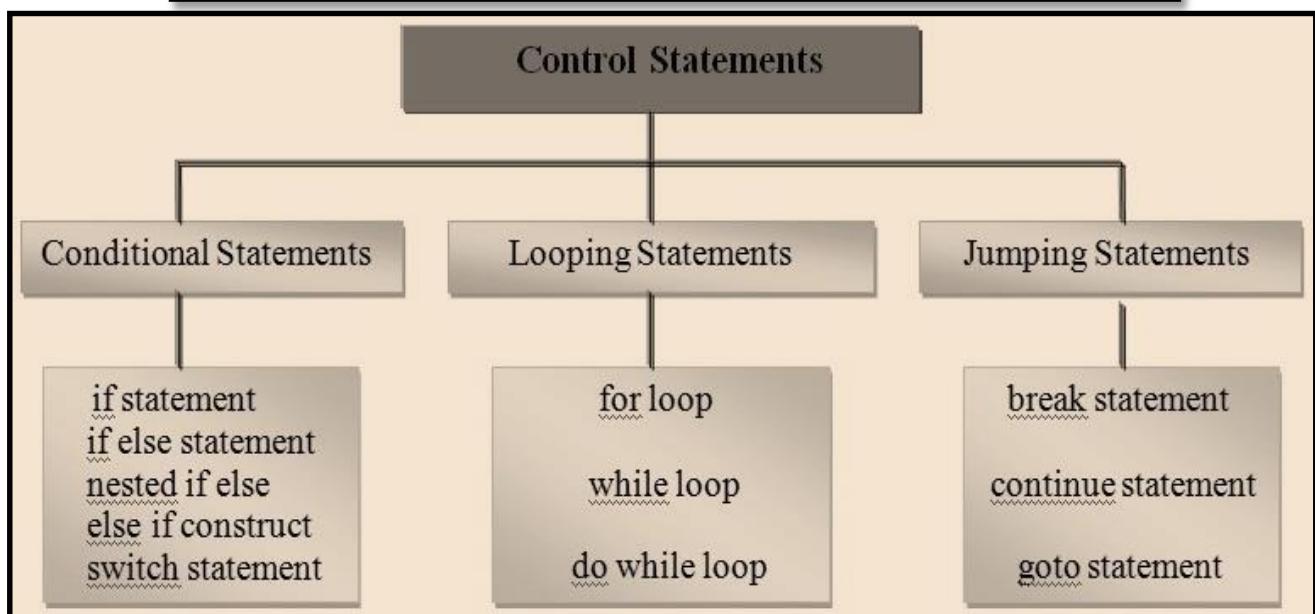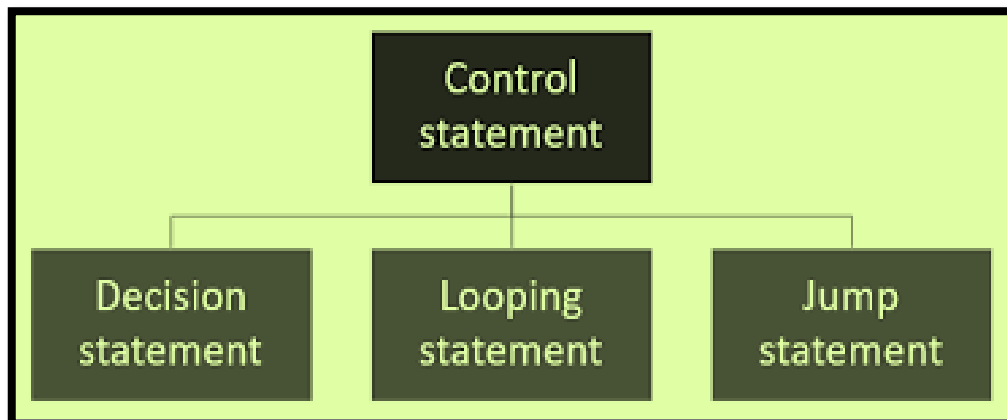
If Statements:

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If Statement :-
" To check condition & return result "

✓ **Simple if statement:**

Detail :-

❖ C language provide a very powerful control structure that is "ifstatement."
❖ It is decision statement that use to take some decision.
❖ If statement support different flavors or types.
❖ In this statement first of all condition will be checked.
❖ If condition become true than the statement following if will be execute.
❖ If condition become false than condition will be terminated.

The general syntax of simple if statement is follows as:

Syntax:-

```
If(expression)
{
    Statement-block;
}
Statement next;
```

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✓ **if-else statement:**

Detail :-

❖ In this statement first of all , condition will be checked.

❖ If condition become true than statement following if will be execute.

❖ If condition become false then statement following else will be execute.

Syntax:-

> **If(expression)**
> **{**
>   **Statement-block;**
> **}**
> **else**
> **{**
>   **Statement-block;**
> **}**
> **Next statement;**

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✓ If-else if-else statement:
Detail :-

- ❖ In this case,first of all first condition will be checked.
- ❖ If first condition become false than second condition will be checked.
- ❖ If second condition become false than other condtion will be checked.
- ❖ If any condition become true than the statement following that 'if' will beexecuted.
- ❖ If no any conditions become true than finally the statement following elsewill be execute.

Syntax:-
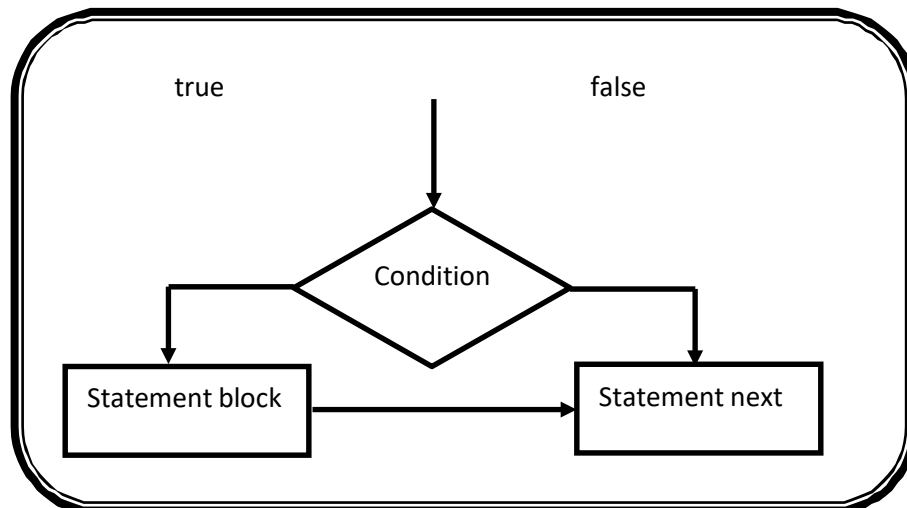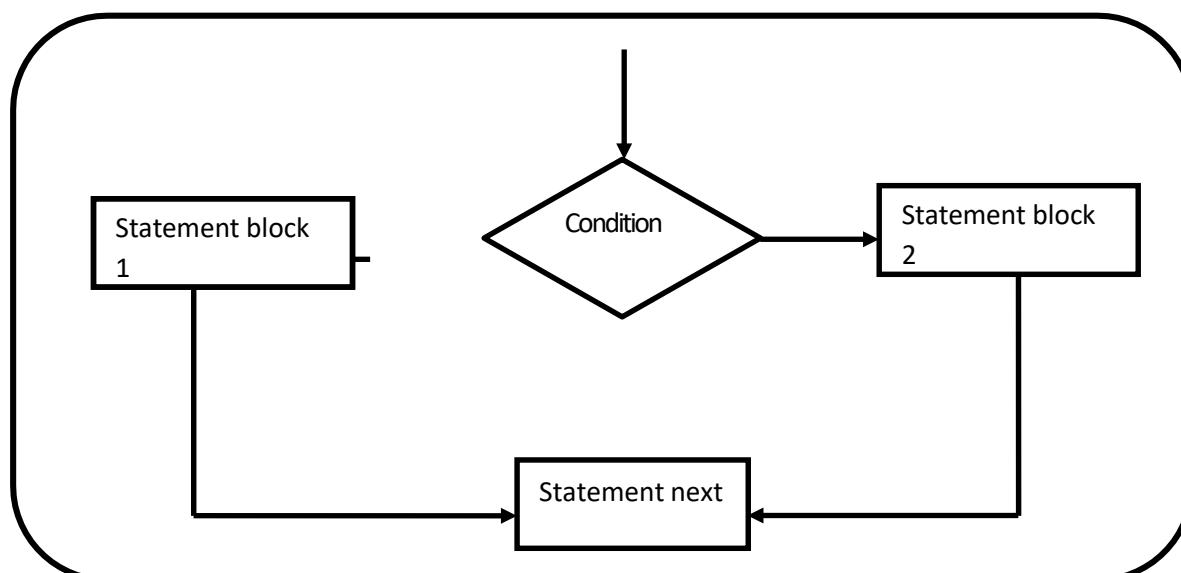
```
If(expression1)
{
        statement block 1
}
Else  if(expression2)
{
        statement block 2;
}
```

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Else if(expression3)
{
        statement;
}
  Next statements;

Example:

```
#include<stdio.h>
#include<conio.h>
void main()
{
   int no;
    clrscr();
   printf("\n enter the number");
  scanf("%d",&no);
   printf("\n number is zero");
   else
   printf("\n number is positive");
  getch();
}
```
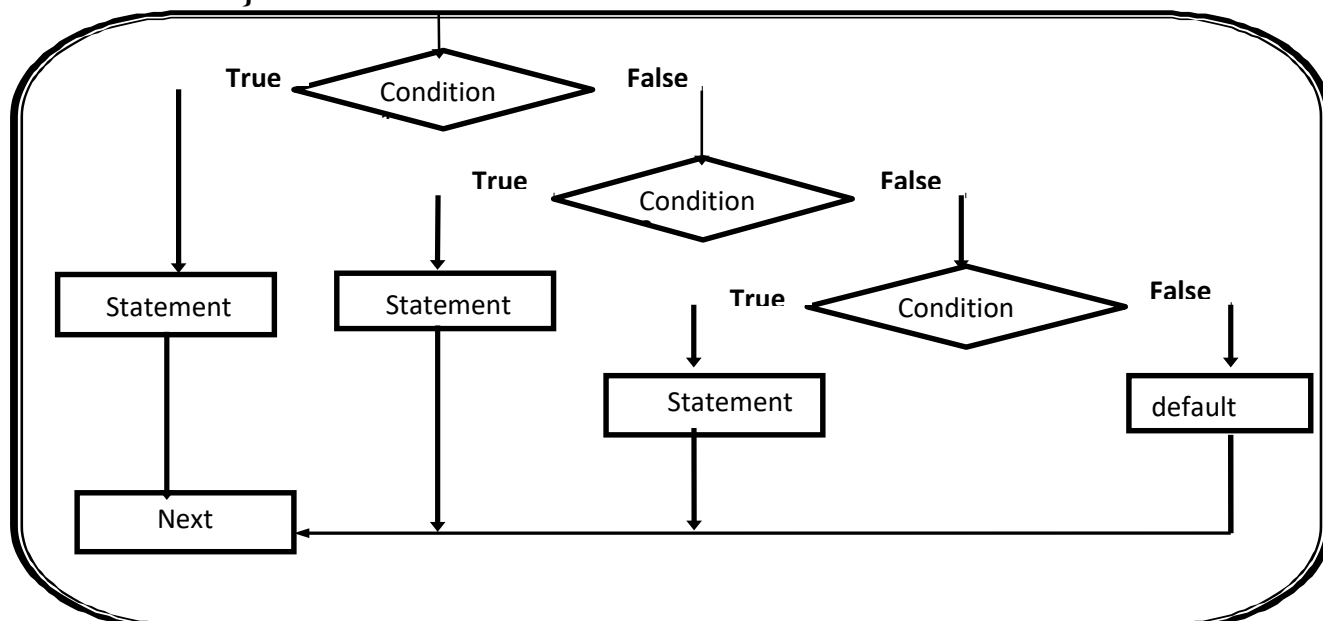
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Q-2 Explain Nested If with example.

Detail :-

❖ In this statement , user can create one if statement inside other if statement ,that is called nested if.

❖ It means that we create outside if than it is called "outer if" and if we createinside if than it is called "inner if".

Syntax:-

```
If(expression1)
{
if(expression2)
{
        statement block 1
}
Else
{
        statement block 2;
}
Else
{
        statement block 3;
}

Next statements;
```

Example:-

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int n1,n2,n3;
```

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```
            clrscr();
        printf("\n enter the n1,n2,n3");
        scanf("%d",&n1,&n2,&n3);
            if(n1>n2)
          {
          If(n1>n3)
                printf("\n n1 is max");
                else
                printf("\n n3 is max");

                else If(n2>n3)
                    printf("\n n2 is max");
                else

                    printf("\n n3 is max");
          }
        getch();
      }
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	How Many Control Structures available in C ? Give name.	6 (two) If Statement Switch Statement
2	If any condition become false ,statement following_____will be execute.	Else
3	In nested if first of all_____condition will be checked.	Outer
4	How mamy flavors/types of If statement.Givename.	4(four) Simple if If….else If…else..if…els eNested if

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5	Which indicate easy way to represent multipleconditions at the same time?	Else…i

Q-3 Explain Switch case statement with example.

> **" MULTI WAY DECISION STATEMENT"**
>
> **CASE :-** WE CAN CREATE *ANY NUMBER OF CASE VALUES* INSIDE
>
> SINGLE SWITCH STATEMENT.
>
> **DEFAULT :-** IT EXECUTE WHEN NO ANY CASE VALUE BECOME TRUE

- ❖ The switch case statement is also known as multi condition statement.
- ❖ It provide facility to check the condition.
- ❖ Switch case make it easy to give the choice and take the decision.
- ❖ It also support multiple case values. But at a time only one case value Become true.
- ❖ If any case value match with the condition than finally statement following that case will be execute.
- ❖ If no any case value match with the condition then finally the statement following default will be execute.

  Break :-

  - ❖ This statement is used to end or stop process of particular case.
  - ❖ Without break the program will continue to the next case

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Syntax:-

```
Switch(Condition)
{
        Case Expression 1:
                Statement
                block1;break;

        Case Expression 2:
                Statement
                block2;break;
                ………………
                ……………..

        default:
                Statement block;
}
```

Example:

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

void main()
{
    int
  color=1;
  clrscr();
   printf("\n enter the color 1. RED 2. GREEN 3. BLUE");
  scanf("%d",&color);
   switch(color)
   {
      case 1:
        printf("\n RED");
```

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```
          break;
       case 2:
          printf("\n GREEN");
             break;
       case 3:
          printf("\n BLUE");
             break;
       default:
          printf("\n NO COLOR");
             }
       getch();
       }
```

1 Word Question – Answer

| SR.NO.	QUESTION	ANSWER
1	Switch represent _____	Multiway Decision Statement
2	If no any case value match with condition then statement following_____will execute.	Default
3	_____ statement is used to terminate particular case.	Break
4	In switch case statement , any case value will be followed by_____sign.	: (Colon)
5	Write down syntax to represent switch statement	Switch(Expression)

Q-4 Explain Conditional Operator with example.

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❖ <u>CONDITIONAL OPERATOR IS SIMILAR TO</u>" IF – ELSE " STATEMENT.

o *CONDITIONAL OPERATOR ALSO KNOWN AS"TERNARY OPERATOR"*

true

(condition) ? expression1 : expression2
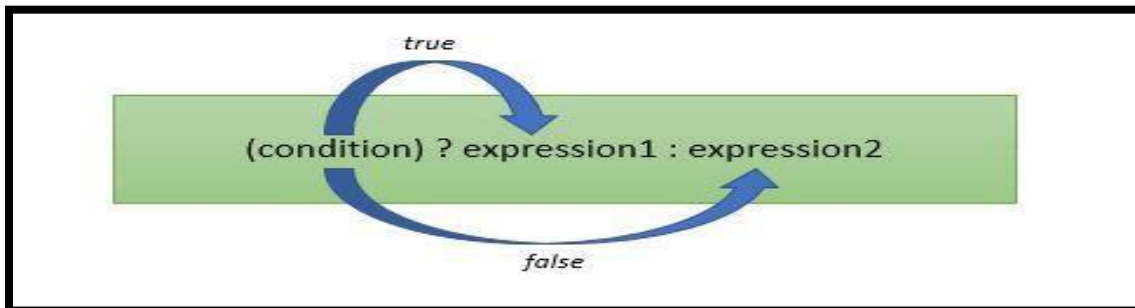
false

Detail :-

- ❖ The conditional operator is also known as ternary operator.
- ❖ The conditional statement is used to check the condition.
- ❖ The conditional operator support mainly 3 arguments.
    - (i)Condition
    - (ii)True Part
    - (iii)FalsePart
- ❖ In C language there are two conditional operators.
    - ▪ ? (Question mark) --True part
    - ▪ : (Colon) -- False part

- ❖ The general form of the ternary operator is as follow:

Syntax:

(Condition)? Statement-1 : statement -2;

- ❖ First of all condition will be checked.
- ❖ If the condition become true then the statement followed by ? is executed

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❖ If condition become false than the statement followed by : is executed.

Example :

(a>b)? printf("a is maximum"): printf("b is maximum");

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Conditional operator also known as _____	Ternary operator
2	Syntax for conditional operator is_____	(condition) ?<statement -1> : <statement -2>
3	In conditional operator_____is used to indicate false part.	: (Colon)
4	Conditional operator is similar to _____statement.	If….else

Q-5 Explain Iterative (looping) control statements.

Loop Means " to execute block of code repeatedly".

Looping statements also called "Iterative statements".
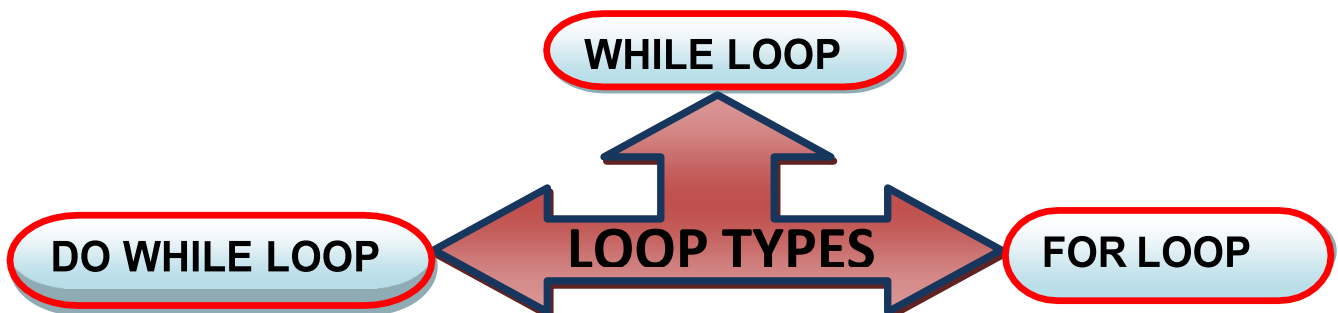
WHILE LOOP

DO WHILE LOOP   **LOOP TYPES**   **FOR LOOP**

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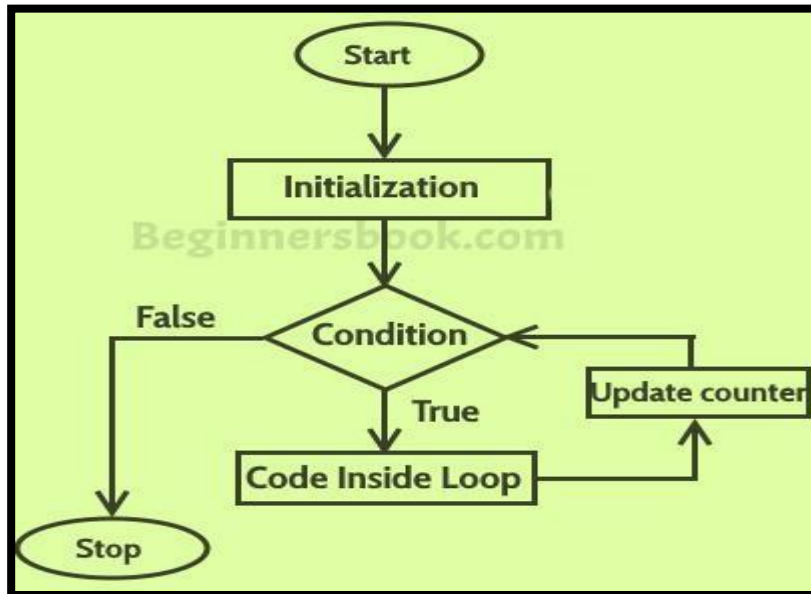|	
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LOOP EXECUTION :-

Detail :-

- ❖ Loop is used to execute the statements for number of times .
- ❖ Loop provide easy way to repeat the task and reduce the code.
- ❖ A loop is a group of statements that are executed until some condition satisfied.
- ❖ In C language we have to provide Following to execute any loop.
    - ▪ Starting value
    - ▪ Condition
    - ▪ Increment/Decrement

- ❖ In C language there are 3 types of looping statements.

    - o While loop [Entry Controlled loop]
    - o Do..while loop [Exit Controlled loop]
    - o For loop [Entry Controlled loop]

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❖ A loop declaration and execution can be done in following ways.
- Check condition to start a loop
- Initialize loop with declaring a variable.
- Executing statements inside loop.
- Increment or decrement of value of a variable.

(i) While loop:

- While loop is also known as **Entry controlled loop.**
- While loop is entry controlled loop because the condition will bechecked first then statement will be execute.
- In this loop , if condition become true then statement will be execute otherwise loop will be terminated.
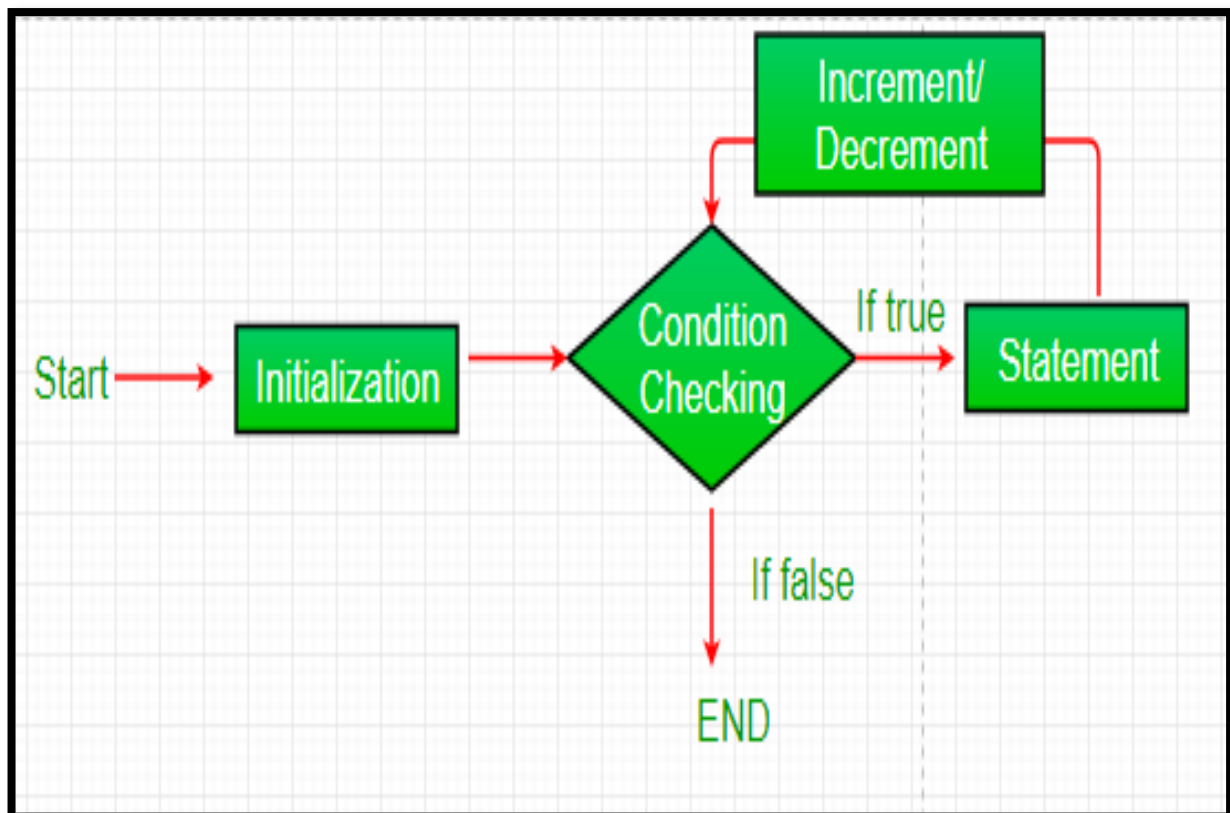
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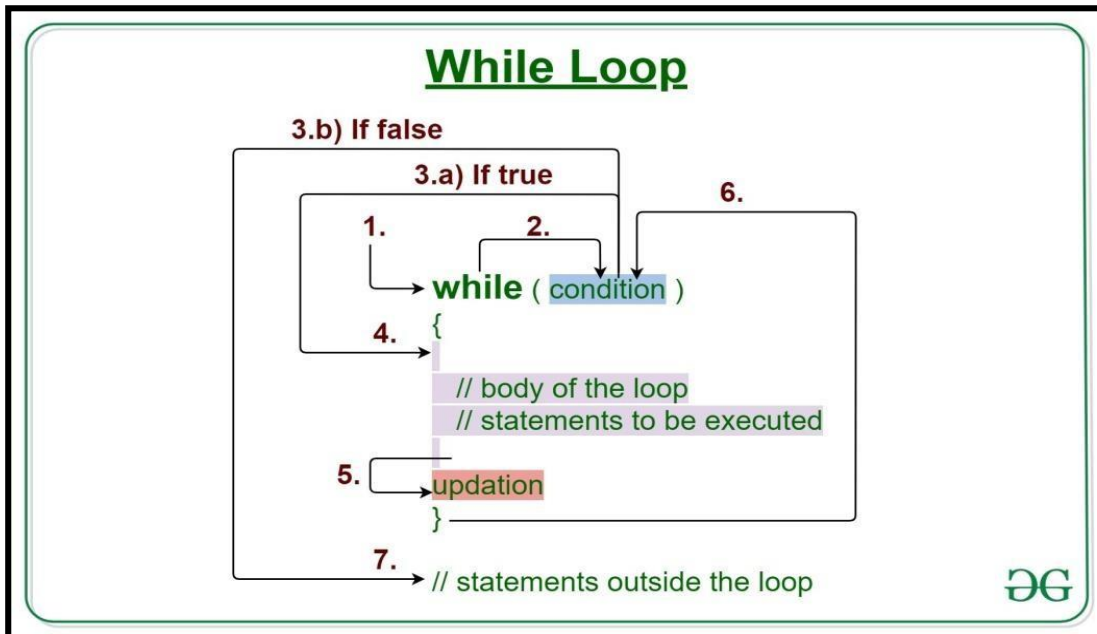
While Loop

Syntax:-:-:

```
while(condition)
{
        statements;
        increment/decrement;
}
```

Example:

```
int a;
    clrscr();
    a=1;
    while(a<=5)
    {
            printf("\n TechnoExam");
            a+=1    // i.e. a = a + 1
    }
```

(ii)   Do..While loop:

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- Do..While loop is also known as **Exit controlled loop.**
- Do..While loop is exit controlled loop because the statement willbe execute first and condition will be checked at last.
- In this loop , if condition become false then atleast once statement will be execute because condition will be checked at last.
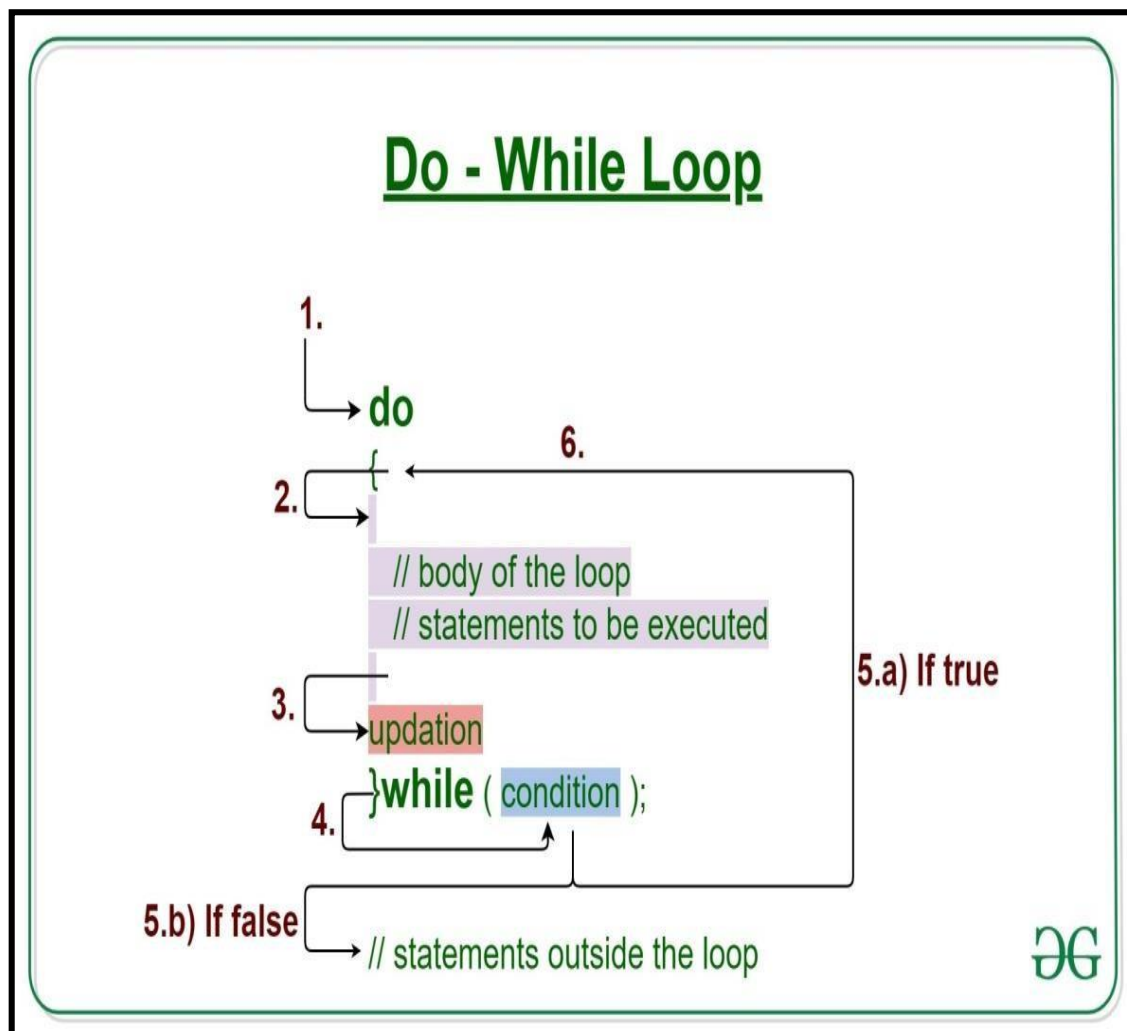
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Syntax:
```
do
{

    statements;
    (increment/decrement);


}while(condition);
```

Example:
```
int i=1;

 clrscr();
do
{
        printf("\n %d",i);
        i++;
}while(i<=10);
```

(iii)   For loop:
- For loop is also known as **Entry controlled loop.**
- It is also known as faster loop in C language.
- In this loop we can give starting value , condition and increment /decrement in single line.

Syntax:
```
for(Initialization; test-condition; increment /decrement)
{
        Statements;
}
```

Example:
```
clrscr();
```

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```
for(i=0; i<5; i++)
{
        printf("\n\t Hello");  // 5 times
}
```

Q-6 Explain Nested Loop in C Language.

Nested loops are the loops which contain another looping statement in a single loop.
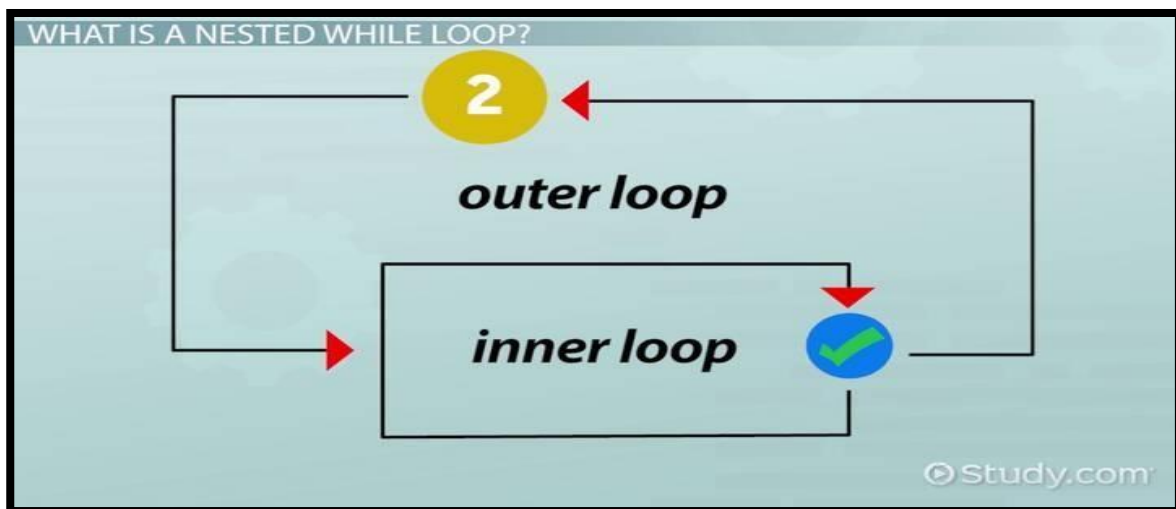
Detail :-

- ❖ Nested loop provide facility to create one loop inside other loop.
- ❖ You can create number of looping statement inside single loop.
- ❖ The first loop is known as outer loop and the loop inside first loop is called inner loop.
- ❖ The outer loop is used for counting rows and the inner loop is used for counting columns.

Syntax:

```
for(Initialization; test-condition; increment /decrement)
{
```

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```
For(Initialization;test-condition;increment/decrement)
    {
            statements;
    }
  }
```

Example:
```
        Int i ,j;
        for(i=1; i<=5; i++)
        {
            For(j=1;j<=i;j++)
              {
                    Printf("* ");
              }
        }
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Nested loop means_____	Loop within Loop
2	The first loop in nested loop is called _____	Outer loop
3	The loop inside the first loop is called _____	Inner loop

Q-7 Explain Break , continue & Goto Statements.
                    OR
Explain Jumping Statements in detail.

Detail :-
   ❖ The jumping statements are used to transfer the program control.
   ❖ There are following jumping statements available in C.
       (i)Break
       (ii)Continue
       (iii)Goto

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(i) break Statement:

- Sometimes it is necessary to stop execution of the program.
- The break statement is unconditional statement.
- Break statement is used for terminating the loop or jump out fromthe loop.
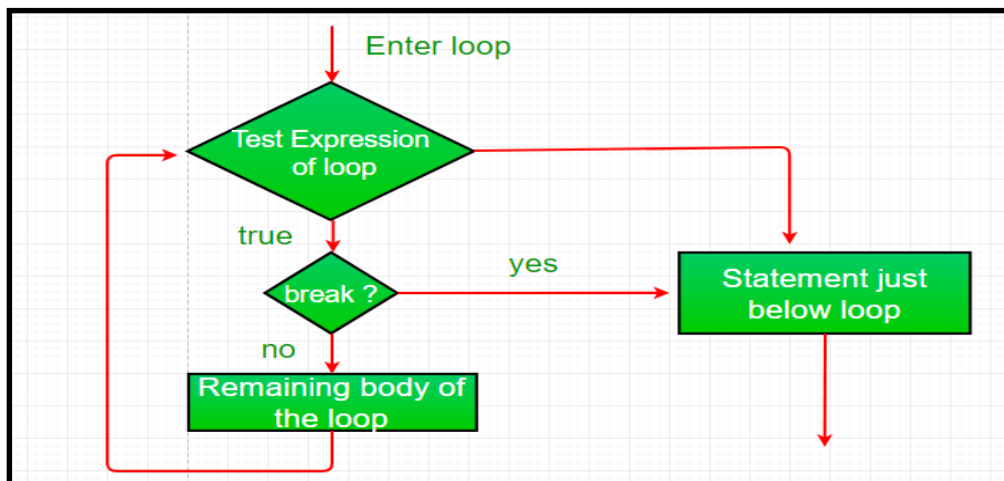
Syntax:
   Break;

Example:
```
int i=1;
  clrscr();
  While(i<=10)
  {
        if(i==5)
        {
             break;
             printf("%d",i);  // 5 times only

        }
  }
```

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(ii)   continue Statement:

❖ The continue statement is used to pass the control to next iteration(loop).

❖ It is also unconditional statement.

❖ Continue does not terminate the loop but only skip the statement followed by if.

Syntax:
```
        Continue;
```
Example:
```
     int i;
    Clrscr();
    For(i=1;i<=10;i++)
    {

            If(i>4)
            {
                Continue;
            }
                Else

            {
                Printf("*\n");
            }
    }
```

(iii)   Goto Statement:

❖ Goto statement is also unconditional statement.

❖ Goto is used to transfer the control (cursor) from one point to another point in the program.

❖ The goto statement is marked by label.

❖ The label is variable name followed by colon(:).

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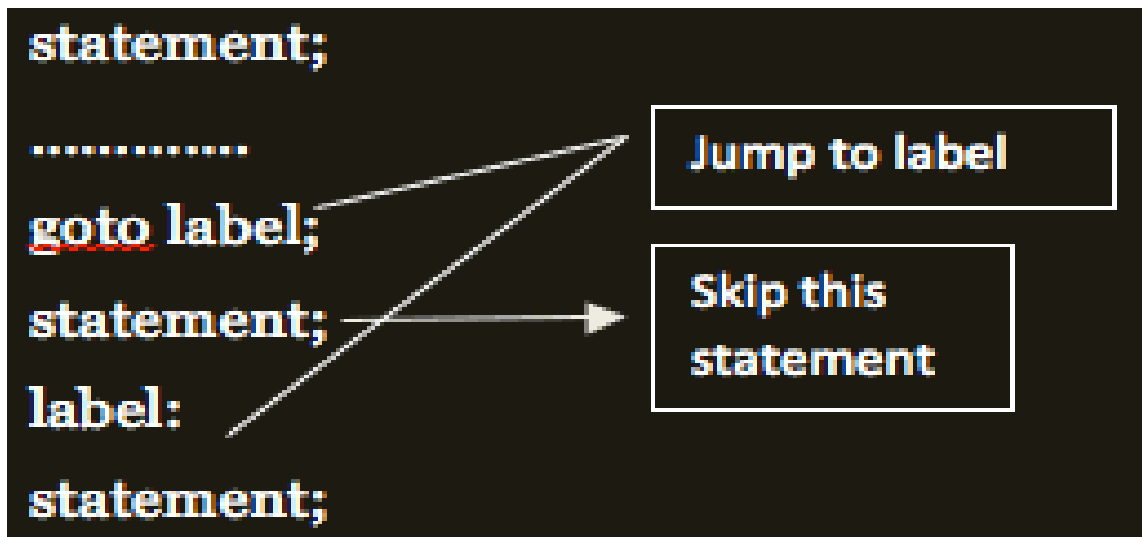
Syntax:

> Goto <variable name>;

Example:

```
int i=10,j=20;
Clrscr();
if(i>j)
{
        goto i;
}
else
{
        goto j;
}
i: printf("I is max");
j:printf("j is max");
Continue;
 }
 else
```

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```
        {
            Printf("*\n");
        }
    }
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	How many jumping statements available in c?	3(Break ,Continue,Goto)
2	_____statement is used to terminate from the loop.	Break
3	_____statement is used to pass control to the next iteration.	Continue
4	_____ statement is used to jump from one point to another point.	Goto

Q-8 Give difference between While loop & Do .. While loop.

While Loop	Do..While Loop
1)While loop is known as EntryControlled Loop.	1)Do..While loop is known as Exitcontrolled Loop.
2) In While loop if condition become false then no any output will be given.	2)n Do..While loop if the condition become true than atleast one loop will be execute & output will be display.
3)There is no terminating semicolon(;) atthe end of loop.	3)There is terminating semicolon(;) at theend of do..while loop.

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4)Syntax :	4)Syntax :
While (<condition>	do
{	{
<Statements>	<Statements>
}	} While (<condition>;

Q-9 Give difference between While loop & For loop.

While Loop	For Loop
1)While loop is bit slower than for loop.	1)For loop is faster than while loop.
2) While loop is not suitable for simpleinitialization.	2)For loop is more suitable when there issimple initialization.

3)Syntax :
 While (<condition>
 {
     <Statements>
 }
	3)Syntax :
	 For(<Initialization>;<Condition>;
	  <Inc./Dec.>)
	 {
	     <Statements>
	 }

Q-10 Give difference between Break & Continue.

Break	Continue
1)Break is used to terminate the block &get the control out of the loop.	1)Continue is used to get the control tothe next iteration of theloop.
2) Break statement can be used in bothswitch case & loop.	2)Continue statement can be only usedwith looping statement.
3)Syntax : <break>;	3)Syntax : <continue>;

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SUMMARY QUESTIONS OF CHAPTER -2

ONE - MARK QUESTIONS

- ✓ What is Loop?
- ✓ What is Conditional Statement?
- ✓ Which Loop is known as Entry controlled Loop?
- ✓ Which Loop is known as Exit controlled Loop?
- ✓ Which Statement is used to Stop the execution of Program or Loop from middle ofIteration?
- ✓ If no any case value match with given condition then the statement following will be execute automatically in Switch Case.
- ✓ Which Statement is also Known as Jumping Statement?
- ✓ How many cases you can create within single Switch Statement?
- ✓ List out different UnConditional Statements in C Language.
- ✓ Any Lable of GoTo Statement can be followed by_.

TWO - MARK QUESTIONS

- ✓ Explain If…..Else Statement with example.
- ✓ Write down Syntax for if …..Else if…Else Statement.
- ✓ Write down Syntax of For Loop.
- ✓ Write down Syntax for Switch Case Statement.
- ✓ Explain GoTo Statement in brief.
- ✓ Write note on Conditional(Ternary) Operator.

THREE - MARK QUESTIONS

- ✓ Explain Nested If with Suitable Example.
- ✓ Give difference between While and Do While.
- ✓ Give difference between Break and Continue.
- ✓ Explain If…Else if Ladders with Example.

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FIVE - MARK QUESTIONS

- ✓ List out different Looping Statements(Iterative Statements) and Explain any two withExample.
- ✓ Explain Switch Case with Example.
- ✓ List out different Conditional Statements(Control Structure) and Explain any one withExample.
- ✓ Write note on Break , continue and GoTo.

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CHAPTER-3
FUNCTIONS (INBUILT & USER DEFINED)

- Types of functions
- Types of library functions
  - **string functions**

    strcpy(), strncpy(), strcat(), strncat(), strchr(), strrchr(), strcmp(), strncmp(), strspn(), strcspn(), strlen(), strpbrk(), strstr(), strtok()
  - **Mathematical Functions**

    Acos(), asin(), atan(), ceil(), cos(), div(), exp(), fabs(), floor(), fmod(), log(), modf(), pow(), sin(), sqrt()
  - **Date and time functions**

    clock(), difftime(), mktime(), time(),asctime(),ctime(), gmtime(), localtime(), strftime()
  - **I/O Formatting Functions**

    printf(), scanf(), getc(), getchar(), gets(), putc(),putchar(), puts(),ungetc()
  - **Miscellaneous Functions**

    delay(), clrscr(), clearer(), errno(), isalnum(), isalpha(), iscntrl(), isdigit(), isgraph(), islower(), isprint(), isspace(), isupper(), isxdigit(), toupper(), tolower().
  - **Standard Library functions**

    abs(), atof(), atol(), exit(), free(), labs(), qsort(), rand(), strtoul(), srand()
  - **Memory Allocation functions**

    malloc(), realloc(), calloc()

- Types of user defined functions
- Pointers
- Function call by value & Function call by reference
- Recursion
- Storage class & Passing and returning value

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Q-1 What is Function ? Explain types of functions.
Detail :-

❖ Function is self contained block that used to perform some specific task.
❖ C language support mainly two types of functions:
- ✓ Built – in Functions(Library Functions)
- ✓ User – defined Functions
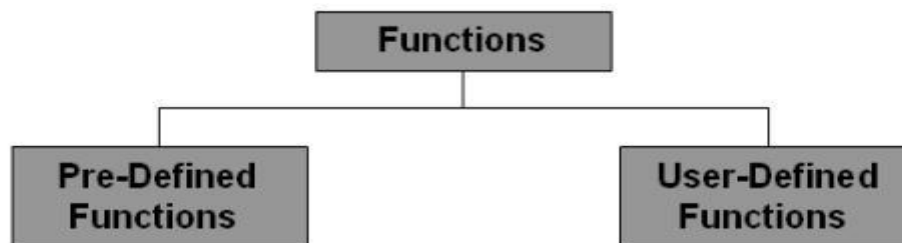
1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Function means_____	Self contained block that used to perform specific task.
2	How many types of functions supported by C?	Built-in(library) User defined

Q-3 List out and Explain different Types of Library functions:

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✓ **String Functions:**

✓ **STRING FUNCTIONS :-**

Detail :-

1. **Strlen() :-**
   • This functions is used to return length of any given string.
   • Length of the string is decide by terminating NULL Character('\0').
     Syntax :- Strlen (<string>)
     Example :- Char str [10] = "hello hi";
               Clrscr();
               Printf("%d",strlen(str));

2. **Strcpy() :-**
   • This function is used to copy the content of one string into another string.
     Syntax :- Strcpy (<destination str> , <source str>)
     Example :- Char str [ ] = "hello friends";
               Char str2[40];

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Clrscr();
Strcpy(str2,str1)
; Printf("%s",
str2);

3. **Strcpy() :-**
    • This function is used to copy first n character of given string intoanother string.
    Syntax :- Strcpy (<destination str> , <source str>,<size upto N>)
    Example :- Char str [ ] = "hello friends";
    Char str2[40];
    Clrscr();
    Strncpy(str2,str1,5);
    Printf("%s", str2);

4. **Strchr() :-**
    • This function is used to search first occurrence of specified character in given string and return rest of the string.
    Syntax :- Strchr (<string>,<Character to be search>)
    Example :- Char str [30] = "hello friends";
    Clrscr();
    Printf("%s", strchr(str,'f');

5. **Strrchr() :-**
    • This function is used to search last occurrence of specified character in given string and return rest of the string.
    Syntax :- Strrchr (<string>,<Character to be search>)
    Example :- Char str1 [30] = "This is just a string";
    Clrscr();
    Printf("%s", strrchr(str1,'s');

6. **Strcmp() :-**
    • This function is used to compare two strings character by character using ASCII value and return integer value.

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- If First string is greater than (>) the second string than it will return positive value.
- If first string is less than(<) the second strint than it will return negative value.
- If both strings are equal than it will return zero (0).

> **Syntax :- Strcmp (<str 1>,<str 2>)**
> **Example :- Char str1 [20] = "ABC";**
>   **Char str2[20] = "abc";**
>   **int c;**
>   **Clrscr();**
>   **C=strcmp(str1,str2);**
>   **Printf("%d",c);**

7. **Strncmp() :-**

- This function is used to compare number character of string one into number character of string two.
- This function start comparing first character of each string.
   Syntax :- int Strncmp (<str 1>,<str 2>,<size upto n>)
   Example :- Char str1 [20] = "R2A6a";
              Char str2[20] = "R2A5a";
              int r;
              Clrscr();
              r = strncmp(str1,str2,4)
              Printf("%d",r);

8. **Strcat() :-**
   - This function is used to append (join) one string with another string.
   - The character of second string will be appended to the first string.
      Syntax :- strcat (<str 1>,<str 2>)
      Example :-
              Char str1 [20] = "str";

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Char str2[20] = "cat";
Clrscr();
Printf("%s",strcat(a,b));

9. Strncat() :-

- This function is used to append (join) specified given number ofcharacters of destination string to source string.

Syntax :-   strncat (<destination string>,<source string>,<upto N>)

Example :- Char str1 [20] = "to be";
Char str2[20] = "or not to be";
Clrscr();
Printf("%s",strncat(str1,str2,6));

10. Strncat() :-

- This function is used to append (join) specified given number ofcharacters of destination string to source string.

Syntax :- strncat (<destination string>,<source string>,<upto N>)

Example :- Char str1 [20] = "to be";
Char str2[20] = "or not to be";Clrscr();
Printf("%s",strncat(str1,str))

11. Strspn() :-

- This function is used to get length of substring of string 1 that ismade up of only those characters contained in string 2.

Syntax :- strspn (<string 1> , <string 2>)
Example :- Char str1 [20] = "I am 123";

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Char str2[20] = "I am sorry123";
int i;
Clrscr();
i=strspn(str1,str2);
Printf("length of matched character is =%d", i);

12. Strcspn() :-

- This function is used to scan the main string for the given stringand return number of characters from beginning till the first matched character is found.

  Syntax :- strcspn (<string > , <string to be search>)

  Example :- Char str1 [20] = "ABCDEFG0123";
  Char str2[20] = "0123";
  int i;
  Clrscr();
  i=strcspn(str1,str2);
  Printf("First Matched character is at =%d", i);

13. Strstr() :-

- This function is used to find out first occurrence of substring str 2 instr 1 and returns remaining string.

  Syntax :- strstr (<str 1> , <str 2>)
  Example :- Char str1 [20] = "hi how r u";
  Char str2[20] = "how";
  Clrscr();
  Printf("substring is = %s",strstr(str1 ,str2));

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14. Strtok() :-

- This function is used to break the string into series of tokens using given delimeter.

    Syntax :-   strtok (<str 1> , <delimeter>)

    Example :- Char str1 [20] = "www.hns.com";

    Char str2[20] = "."; Clrscr();

    Char *t;

    T = strtok(str1,str2);

    While (t!=NULL)

    {

    Printf("%s\n",t);

    T = strtok(str1,str2);

    }

15. Strpbrk() :-

- This function is used to find out first character in first string that match any character in second string.

    Syntax :-   strpbrk (<str 1> , <delimeter>)

    Example :-   **Char str1 [20] = " I love kite";**

    Char str2[20] = "kite";

    Char *t;

    T = strpbrk(str1,str2);

    If(t!=NULL)

    {

    Printf("matched character is =%c\n",*t);Else

    Printf("character not found");

    }

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1 Word Question – Answer

1	Which function is used to concatenate two or more strings?	Strcat()
2	Which function is used to return length of any given string?	Strlen()
3	Which function is used to copy one string into	Strcpy()

✓ **MATHS FUNCTIONS:**

Header File: :- **<math.h>**

✓ **MATHS FUNCTIONS :-**

Detail :-

1. **abs() :-**

   • This functions is used to return absolute value of any given number.
     Syntax :- abs (<number>)
     Example :- abs (-90)

2. **sqrt() :-**

   • This functions is used to return square root of any given number.
     Syntax :- sqrt (<number>)
     Example :- sqrt (100)

3. **ceil() :-**

   • This functions is used to return or round up given value upto near by maximum value of given number.
     Syntax :- ceil (<number>)

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Example :- ceil(-14.55)

4. **floor() :-**
   - This functions is used to return or round up given value upto near by minimum value fo given number.
     Syntax :- floor (<number>)
     Example :- floor(-14.55)

5. **div() :-**
   - This functions is used to return reminder of any given number.
     Syntax :- div (<number>,<divisible by>)
     Example :- div(10,3)

6. **exp() :-**
   - This functions is used to return exponent value of any given number in which e raised to value of n.
     Syntax :- exp (<number>)
     Example :- exp(5)

7. **pow() :-**

   - This functions is used to return the value calculated by given number and its power.
     Syntax :- pow (<number>,<raised to>)
     Example :- pow(2,3)

8. **log() :-**

   - This functions is used to return natural logarithm of any given number.
     Syntax :- log(<number>)
     Example :- log(3.123)

9. **modf() :-**

   - This functions is used to return integer part and floating point part

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of any given number.

Syntax :- modf(<number>,<int.part>)
Example :- modf(3.00000,3)

10.fabs() :-

- This functions is used to return absolute value of floating point number.
Syntax :- fabs(<number>)
Example :- fabs(-23.40)

11.sin() :-

- This functions is used to calculate sine value of given number.
Syntax :- sin(<number>)
Example :- result = sine(param number * pi)/180;

12.cos() :-

- This functions is used to calculate cosine value of any given number.
- It return the value in the range from -1 to +1;
Syntax :- cos(<number>)
Example :- result = cos(number * pi)/180;

13.asin() :- [arc = curve]

- Asin() is known as arc sin function.
- It used to calculate value of arc sine in the range from -1 to +1.
Syntax :- asin(<number>)
Example :- result = asin(number)*180.0/PI;

14.acos() :-

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- This function is used to calculate principle value of any number inthe range from 0 to 3.14

   Syntax :- acos(<number>)
   Example :- acos(number)*180.0/1;

15.atan() :-
   - This function is known as arc tangent function.
   - It is used to calculate principal value of any given number in the range [-n/2 , +n/2].
   Syntax :- atan(<number>)
   Example :- acos(number)*180.0/1;

16. fmod() :

   - This function is used to calculate floating point reminder.
   - You can calculate value like , x/y and it give you reminder.
   Syntax :- fmod(<number>,<divisible by>)
   Example :- fmod(5.3,2);

1 Word Question – Answer

1	Which function is used to round up the value upto nearest maximum integer value?	Ceil()
2	Which function is used to return reminder of any given value?	Div()
3	Which function is used to return absolutevalue of any given value?	Abs()
4	Which function is used to return square root of any given value?	Sqrt()
5	Which header file must be include to perform maths functions?	<math.h>

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✓ **DATE & TIME FUNCTIONS :-**

<time.h>	
clock_t clock()	Returns clock ticks since program starts.
char *asctime(stuct tm)	Converts date and time into ascii.
int stime(time_t *tp)	Sets time.
time_t time(time_t *timer)	Gets time of day.
double difftime(t1,t2)	Returns difference time between two times t1 and t2.

Header File: <time.h>
Detail :-

1. **clock():**

   • clock() determines the amount of processor time used since the invocation of the calling process, measured in clocks_per_sec of a second.

   Syntax:

   clock_t clock(void);

2. **mktime():**

   • mktime() transforms binary date and time values.

   Syntax:

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time_t mktime (struct tm *timeptr);

3. time():

- time() is used to get current system time.

Syntax:

time();

4.difftime():

- difftime() is used to get difference between two given times.

Syntax:

Difftime(endtime , starttime)

5. ctime():

- ctime() converts the time_t object pointed by timer to a C string containing human-readable version of the corresponding local time and date.
- The returned string has following format:

Www Mmm dd hh:mm:ss yyyy

- Where Www is the weekday, Mmm the month in letters, dd the day of the month, hh:mm:ss the time, and yyyy the year.

Syntax:

char * ctime (const time_t * timer);

6. localtime():

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• localtime() converts time_t to tm as localtime.
• localtime() uses the time pointed by timer to fill a tm structure with the values that that represent thecorresponding local time.

Syntax:

struct tm * localtime (const time_t * timer);

7. strftime():

• strftime() format time to string. strftime() copies into a ptr the content of format, expanding its format tags into the corresponding values as specified by tiemptr, with a limit of maxsize characters.

Syntax:

size_t strftime (char * ptr, size_t maxsize, const char * format,const struct tm * timeptr);

1 Word Question – Answer

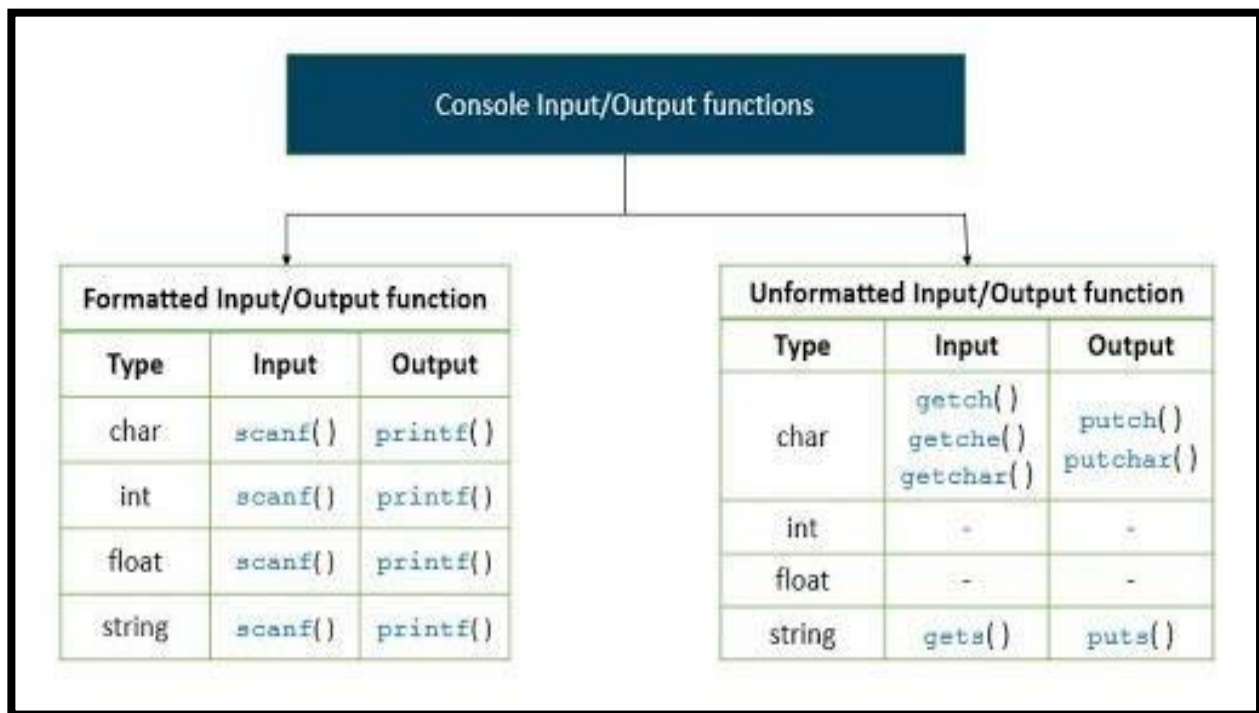| 1	Which function is used to get current system time?	Time()
2	Which function is used to convert time object into string object?	Ctime()
3	Which function is used to get difference between two given times.	Difftime()
4	Which header file must be include to perform time functions?	<Time.h>

✓ **I/O FORMATTING FUNCTIONS :-**

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Header File   :-   <stdio.h>

Console Input/Output functions

Formatted Input/Output function

Type	Input	Output
char	scanf()	printf()
int	scanf()	printf()
float	scanf()	printf()
string	scanf()	printf()

Unformatted Input/Output function

Type	Input	Output
char	getch() getche() getchar()	putch() putchar()
int	-	-
float	-	-
string	gets()	puts()

Detail :-

1. **printf():**

   • printf() is output function. printf() is used for printing formatted data to stdout. This function is generally used for printing text and numericvalues.

   Syntax:

   printf("control string",arg1,arg2…..);

   • In the above syntax, control string indicates how many arguments are there and what their types are. The control string consists of three types:

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- Characters to be printed on screen.
- Format specifiers.
- Escape sequence characters. (\n, \t)

2. scanf():

- scanf() is an input function. It is used to read the data entered by theuser. scanf() scans the formatted values.

Syntax:

scanf("control string",&arg1, &arg2……);

- In the above syntax, control string specifies the field format in which the data is to be entered.The arguments &arg1, &arg2…….specifiesthe address of the locations where the data is stored.

- scanf() is also required to read multiple values using the same scanf function. The control string consists of three types:
    - Characters to be printed on screen.
    - Format specifiers.
    - Escape sequence characters. (\n, \t)

3. getc():

- This function is used to get a single character from input stream.

Syntax:

Getc (<input stream>)

Example:

Ch = getc(stdin);

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4. putc():

- This function is used to put/print a single character to outputstream.

Syntax:

> **putc (<character> , <output stream>)**

Example:

> **Ch = putc('a' , stdout);**

5. gets():

- This function is used to get or read particular string with white space character.

Syntax:

> **Gets(<string>)**

Example:

> **Gets("hello friends");**

6. puts():

- This function is used to put or print particular string with white space character.

Syntax:

> **puts(<string>**

Example:

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```
Void main()
{
        Char ch;
        Printf("enter character");
        Ch = getchar();
        Getch();
}
```

7. **getchar():**

   • This function is used to get a single character from standard input.

   Syntax:

   ```
   <variable> = getchar();
   ```

   Example:

   ```
   Void main()
   {
        Char ch;
        Printf("enter character");
        Ch = getchar();
        Getch();
   }
   ```

8. **putchar():**

   • This function is used to print a single character to standard output.

   Syntax:

   ```
   Putchar(<character variable>)
   ```

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Example:

```
Void main()
{
        Char ch;
        Printf("enter character");
        Ch = getchar();
         Putchar(ch);
        Getch();
}
```

1 Word Question – Answer

1	Which function is used to get or read particular string with white space character?	Gets()
2	Which function is used to print single character to the output stream?	Putc()
3	Which function is used to print formatted output ?	Printf()
4	Which function is used to read input from the userside?	Scanf()

5	Which function is used to read a single character from standard input?	Getchar()
6	Which header file must be include to perform all I/O formatting functions?	<stdio.h>

✓ **STANDARD LIBRARY FUNCTIONS :-**

Header File: :-   <stdio.h>

Detail :-

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1. **atol():**
   - This function is used to convert string argument to long integer value.

   Syntax:

         atol(<string>)

   Example:

   ```
   Void main()
   {
           Char a[20] = "hi friends";
           long b;
           b= atol(a);
           printf("string=%s",longint = %ld",a,b);
           getch();
   }
   ```

2. **atof():**
   - This function is used to convert string argument to float number.

   Syntax:

         atof(<string>)

   Example:

   ```
   Void main()
     {

       Char a[20] = "1234567";
       float b;
       clrscr();
       b= atof(a);
       printf("string=%s",float = %f",a,b);getch();
   }
   ```

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3. **exit():**

   • This function is used to terminate calling process immediately.

   Syntax:

   exit(<int>)

   Example:

   Void main()
   {
       Clrscr();
       Printf("starting of program\n");
       Exit(0);
       Printf("exiting of program\n");
       getch();
   }

4. **labs():**

   • This function is used to return absolute value of long integer value.

   Syntax:

   labs(<long integer>)

   Example:

   Void main()
   {

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```
long int a,b;
a=labs(65987);
Printf("%ld\n",a);
B=labs(-100509);
Printf("%ld\n",b);
getch();

}
```

5. **rand():**

   • This function is used to generate random numbers in the range from 0 to n.

   Syntax:

   labs(<long integer>)

   Example:

```
Void main()
{
        int i,n;
        clrscr();
     printf("enter n");
     scanf("%d",&n);
     for(i=1;i<=n;i++)
       {

                Printf("%d",rand()%50);
       }
Getch();
}
```

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1 Word Question – Answer

1	**Which function is used convert stringargument into long integer value?**	**Atol()**
2	Which function is used to terminate callingprocess immediately?	**Exit()**
3	Which function is used to generate randomnumbers in the range from 0 to n?	**Rand()**
4	**Which function is used to return absolutevalue of any long integer value?**	**labs()**

✓ **MISCELLANEOUS FUNCTIONS :-**
   Header File::- **<stdio.h>**

Miscellaneous functions	Description
getenv()	This function gets the current value of the environment variable
setenv()	This function sets the value for environment variable
putenv()	This function modifies the value for environment variable
perror()	Displays most recent error that happened during library function call
rand()	Returns random integer number range from 0 to at least 32767
delay()	Suspends the execution of the program for particular time

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Function	Return Type	Use
isalnum(c)	int	Determine if the argument is alphanumeric or not
isalpha(c)	int	Determine if the argument is alphabetic or not
isascii(c)	int	Determine if the argument is ASCII character or not
isdigit(c)	int	Determine if the argument is a decimal digit or not.
toascii(c)	int	Convert value of argument to ASCII
tolower(c)	int	Convert character to lower case
toupper(c)	int	Convert letter to uppercase

Detail :-

1. **delay():<dos.h>**

   • This function is used to suspend execution of program forparticular amount of time.

   Syntax:

   delay(<int>)

   Example:
   #include<dos.h>

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```
Void main()
{
        printf("This c program will exit in 10 seconds.\n");
       delay(10000);
       getch();
}
```

• Above c program exits in ten seconds, after the printf function is executed the program waits for 10000 milliseconds or 10 seconds and then program termination occurs.

2. clrscr():

• This function is used to clear the output of the screen.

Syntax:

```
Clrscr();
```

Example:

```
Void main()
{

Int i=10;
Clrscr();
printf("%d",i);

getch();
}
```

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3. islower():<ctype.h>

- This function is used to check if entered character is in lowercaseor not.

Syntax:

islower(character);

Example:
#include<ctype.h>

```
Void main()
{
        Char ch = 'A';
        Clrscr();
If(islower(ch))
        Printf("lowercase");
Else
        Printf("not in lowercase");

        getch();
}
```

4. isupper():<ctype.h>

- This function is used to check if entered character is in uppercase or not.

Syntax:

isupper(character);

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

        Void main()
        {
                Char ch =
                'A'; Clrscr();
                If(isupper(ch))
                        Printf("uppercase");
                Else
                        Printf("not in uppercase");
            getch(); }
```

5. **isspace():<ctype.h>**

- This function is used to check if entered character is whitespace character or not.

Syntax:
    isspace(character);

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

        Void main()
        {
             Char ch = ' ';
            Clrscr();
            If(isspace(ch))
                    Printf("whitespace ");
            Else
```

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Printf("not whitespace");

getch();
}

6. **isalpha():<ctype.h>**

- This function is used to check if entered character is alphabet ornot.

Syntax:

Isalpha(character);

Example:
#include<ctype.h>

Void main()
{

Clrscr();
If(isalpha(ch))
Printf("alphabet");
Else
Printf("not alphabet");

Getch();

}

7. **isprint():<ctype.h>**

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- This function is used to check if entered character is printable or not.

Syntax:

> Isalpha(character);

Example:
> #include<ctype.h>

> Void main()
> {
>
>> Char ch = 1;
>> Clrscr();
>> If(isprint(ch))
>>> Printf("printable");
>> Else
>>> Printf("not printable");
>
>> getch();
> }

8. **isdigit():<ctype.h>**

- This function is used to check if entered character is digit or not.

Syntax:

> Isdigit(character);

Example:
> #include<ctype.h>

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```
Void main()
{

        Char ch = 'a';
        Clrscr();
        If(isdigit(ch))
                Printf("digit");
        Else
                Printf("not digit");

        getch(); }
```

9. **isalnum():<ctype.h>**

•   This function is used to check if entered character is alphabet or number.

Syntax:

      Isalnum(character);

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

Void main()
{
        Char ch = 'a';
        Clrscr();
        If(isalnum(ch))
                Printf("alpha-numeric");

        Else
```

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Printf("not alpha-numeric");

getch();
}

10. **isctrl():<ctype.h>**

- This function is used to check if entered character is control character or not.

Syntax:

Isdigit(character);

Example:
#include<ctype.h>

Void main()
{
Char ch = '%';
Clrscr();
If(isctrl (ch))
Printf("control character");
Else
Printf("not control character");

getch();
}

11.**errno():<ctype.h>**

- This function is used to return error number related to particular object.

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- **Note :-** you have to include header file **<errno.h>**

Syntax:

   errno( );

Example:
   #include<errno.h>

   Void main()
   {
        File *fp;
        Fp=fopen("hello.txt","r");
       Printf("errno=%d\n",errno());

        Getch();
   }

12. toupper():<ctype.h>

   • This function is used to convert lowercase character intouppercase.

Syntax:

   toupper(<character>)

Example:
 #include<errno.h>

   Void main()
   {

        Char ch= 'a';

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```
            Clrscr();
            Int c=toupper(ch);
           Printf("%c",c);
           getch();
       }
```

13. **tolower():<ctype.h>**

- This function is used to convert uppercase character   into lowercase.

Syntax:

> tolower(<character>)

Example:

> **#include<errno.h>**

> **Void main()**
> **{**
>
>   **Char ch= 'A';**
>   **Clrscr();**
>   **Int c=tolower(ch);**
>   **Printf("%c",c);**
>   **getch();**
> **}**

> <mark>**1 Word Question – Answer**</mark>

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1	Which function is used convert lowercase character into uppercase?	Toupper()
2	Which function is used to check if entered character is digit or not ?	Isdigit()
3	Which function is used to check if entered character is white space character or not?	Isspace()
4	This function is used to suspend execution ofprogram for particular amount of time.	Delay()
5	Which function is used to clear the output screen()?	Clrscr()

✓ **MEMORY ALLOCATION FUNCTIONS :-**

Header File: :- <stdio.h>

- In c language there are two types of memory allocation:
  - Static memory allocation -designtime
  - Dynamic memory allocation -runtime

1. malloc():

- This function is used to allocate single block of requested memory.
- It always return NULL if memory is not sufficient.

  Syntax:

  Ptr = (cast_type) malloc(byte_size)

  Example:

  Ptr = (int) malloc(100*sizeof(int))

2. calloc():

- This function is used to allocate multiple block of requested memory.

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- It always return 0(zero) if memory is not sufficient.

   Syntax:

   Ptr = (cast_type) calloc(number ,byte_size)

   Example:
   Ptr = (float) calloc(25,sizeof(float))

3. realloc():

- If memory is not sufficient for malloc & calloc at that time you can use realloc() to re – allocate the memory space.
- It always return 0(zero) if memory is not sufficient.

   Syntax:

   Ptr = realloc(ptr , newsize)

   Example:
   Ptr = realloc(p,n*sizeof(int))

4. free():

- The memory allocated by malloc and calloc will be released or free by calling free().
- It occupies memory until you exit your program

   Syntax:

   Free(<pointer variable>)

   Example:

   Void main()
   {

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```
 Char *str;
Clrscr();
 Str = "tutorialpoint";

 Printf("string=%s,address=%u\n",str,str);
 Free(str);
 getch();
}
```

1 Word Question – Answer

1	Which function is used allocate single block of requested memory?	Malloc()
2	Which function is used to allocate multipleblock of requested memory?	Calloc()
3	Which function is used to re-allocate the memory space?()	Realloc()
4	Which function is used to free the memory space allocated by malloc() and calloc()	Free()

Q-4 Explain UDF in detail.

Detail :-

❖   UDF stands for User Defined Function.
❖   UDF is a self contained block that perform some task.
❖   UDF Contains mainly following criteria:

   1. **Function Declaration (Function Prototype):**

   • The calling program should declare the function before it is used.
   • This is known as function declaration or function prototype.

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- A function declaration contains four elements
  - Function type

  - Function name
  - parameters list
  - terminating semicolon

Syntax:

function_type function_name(parameter list);

Example:

int add(int, int);

- Function declaration is similar to function header except the terminating semicolon.

✓ **Function Definition:**
- The function definition consists of the whole description and code of afunction.
- A function is called by simply writing the name of the function followed bythe argument list inside the parenthesis.

Syntax:

function_type function_name(parameter list)
{
    local variable
    declaration;function
    statement 1;
    function statement 2;
        .
        .
        .

    return statement;

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}

Example :-

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

✓ **Function call:**

- A function can be called by using the function name and list of actual parameters.

    Example
    :main()

```
{
      c=add(10,5);//function call
    printf("%d",c);
}
```

- In the above example, when a function calls statement encounter in program then the control is transferred to the function add().
- After this add function is executed line by line and the answer is return to the function call using the return statement.

Actual Parameters: The parameters which are used in functioncall is known as actual parameter. Actual parameters send the copy of the data of called function.

Formal Parameters: The parameters which are used in functiondefinition is known as formal parameters. Formal parameters will receive the data, sent by calling function.

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1 Word Question – Answer

1	UDF stands for_____	User defined function
2	Function declaration also called _____	Function prototype
3	The parameters which are used in function call is known as_____.	Actual parameters
4	The parameters which are used in function definition is known as_____.	Formal parameters

Q-4 Explain UDF with types.
Detail :

- UDF stands for User Defined Function.

- UDF is a self contained block that perform some task.

- UDF support mainly four types :
  - ✓ No argument No return
  - ✓ No argument with return
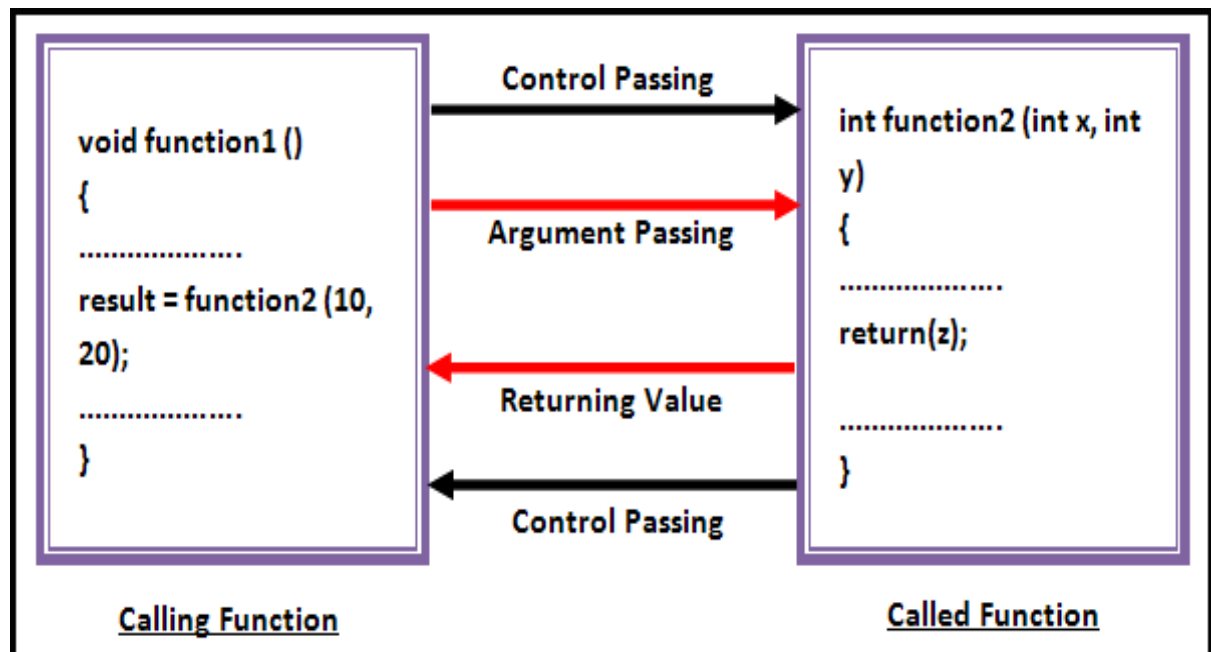 - ✓ With argument no return
  - ✓ With argument with return

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✓ **No argument No return:-**

- This type of function does not receive any value and does not return any value.

Example :-

```
Void sk();    //function prototype
Void main()
{
      Sk();  //function calling
      getch();
}
Void sk()  //function definition
{
      Printf("hello");
}
```

✓ **No argument with return:-**
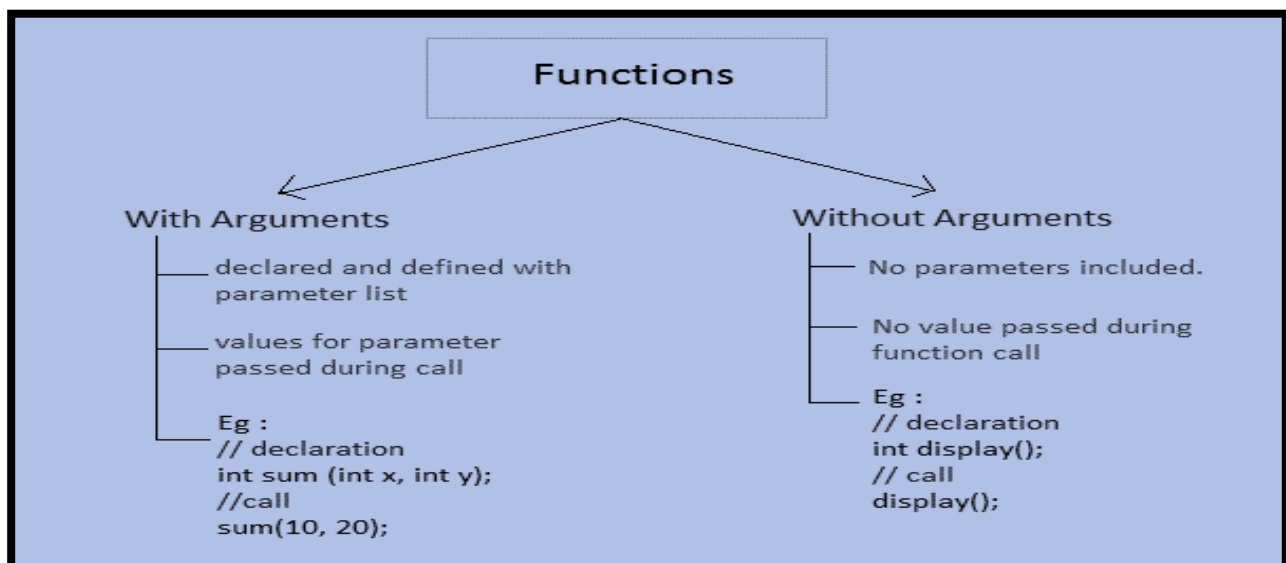
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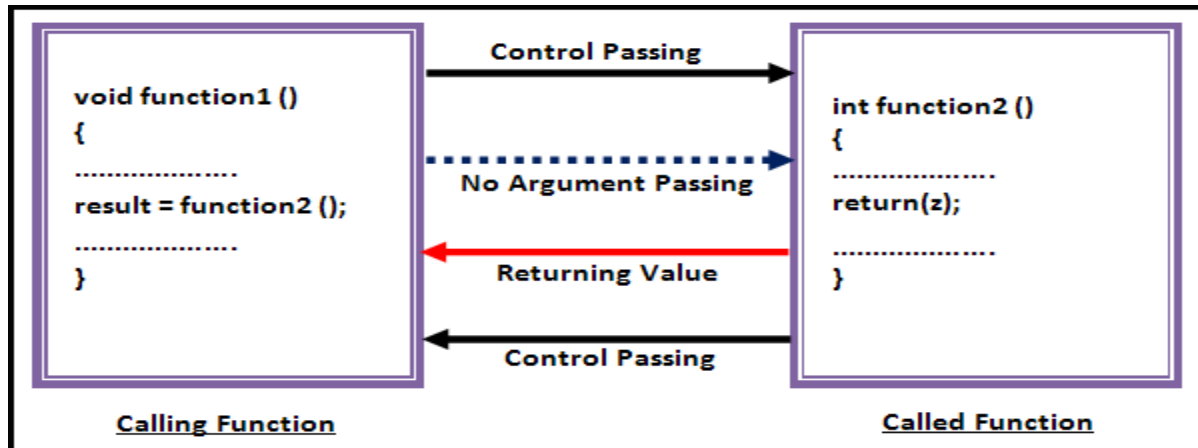
- This type of function does not receive any value but return some value.

Example :-
```
int sk();     //function prototype
Void main()
{
    Int c;
    c = sk();    //function calling
    Printf("%d",
  c);

    getch();
}
int sk()   //function definition
{
    Int i=10;
    Return
    (i);
}
```

✓ **with argument no return:-**

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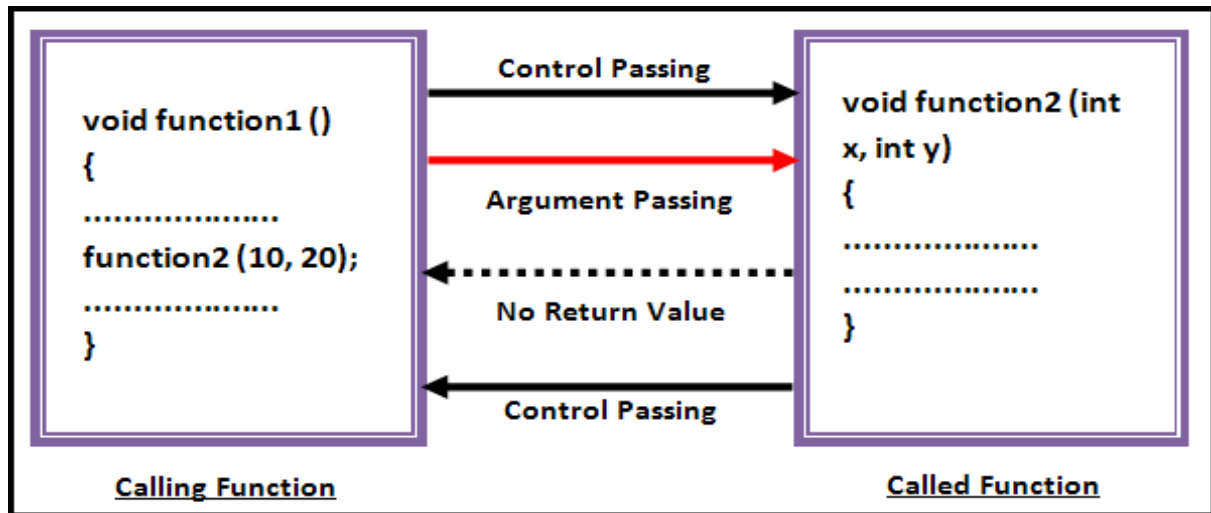
- This type of function receive some value but never return some value.

  Example :-

  ```
  void sk(int);     //function prototype
  Void main()
  {
       Int i=10;
       sk(i);     //function calling
       Printf("%d",c);
       getch();
  }

  void sk(int n)  //function definition
  {
       Printf("%d",n);
  }
  ```

✓ **with argument with return:-**

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- This type of function receive some value and also return some value.

Example :-
```
int sk(int,int);      //function prototype
Void main()
{
     Int  a=10,b=20,c;
     c=sk(a,b);     //function calling
     Printf("%d",c);
     getch();
}
int sk(int x , int y)  //function definition
{
     int z; z=x+y;
     return(z);
}
```

1 Word Question – Answer

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1	How many types of UDF?	4
2	List out types of User defined function.	*No argument No return *With argument No return *No argument with return *With argument with return

Q-5 Explain Pointer in brief.

WHAT IS POINTER?

o A **pointer** is a variable whose value is the address of another variable, i.e., direct address of the memory location. Like any variable or constant, you must declare a pointer before you can use it to store any variable address.

o The general form of a pointer variable declaration is:

dataType *var_name;

o Here,

- *dataType* is the pointer's base type; it must be a valid C data type(i.e., int, float, char etc).

- **var_name** is the name of the pointer variable.

- The asterisk * you used to declare a pointer is the same asterisk that you use for multiplication. However, in this statement the asterisk is being used to designate a variable as a pointer.

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Pointer Declaration

- **Type * Varname;**
  declares **Varname** as a pointer to **Type**

- **Examples**

  A is a pointer to a character

  B is a pointer to an integer

  ```
  char*  A;
  int*  B;
  struct node *  Root;
  ```

  Root is a pointer to a node structure

- ***** associates with the variable name

  ```
  char *A,  B;
  ```

  A is a pointer to a character

  B is a character !

  Pg. 9

Detail :-

- Pointer is a user defined data type.
- Pointer is variable that store memory address of another variable.
- Pointer is used to point out the memory address.
- Pointer have three main concept:

✓ **Pointer Constant :-**
  - In pointer the memory address is known as pointer constant .
  - We can not change its value.

✓ **Pointer Value:-**
  - A pointer value means address of another variable.
  - If we want to access value of memory address then we have to use
    * (astrik) Operator.

✓ **Pointer Variable:-**

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▪ It is variable that store

pointer value like;int a=5
//simple variable
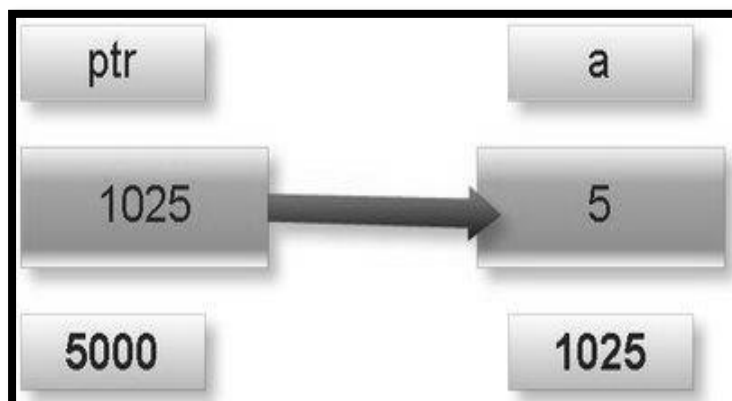int *ptr; **// pointer variable**

ptr=&a; **//address of a**

Explanation:

About variable a:
- ✓ Name of the variable: a
- ✓ Value of the variable which it keeps: 5
- ✓ Address where it has stored in the memory : 1025 (assume)

About variable ptr:
- ✓ Name of the variable : ptr
- ✓ Value of the variable which it keeps : 1025
- ✓ Address where it has stored in the memory : 5000 (assume).

Note:

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➢ * is known as indirection operator which gives the content of any variable.

➢ & is known as reference operator which gives addresswhere variable has stored in memory.

1 Word Question – Answer

1	Pointer is_____datatype.	User defined
2	Pointer is a variable that store_____ of another variable.	Memory address
3	_____is known as indirection operator which gives the content of any variable.	Astrik(*)
4	_____is known as reference operator which gives address where variable has stored in memory.	Ampersand(&)

Q-6 Explain Call by Value and Call by Reference with example.

Detail :-

- In c language , arguments can be passed by two ways:
  - ✓ Call by value
  - ✓ Call by reference

1. Call by value :-

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- In call by value the copy of real argument will be passed to formal argument.

- By default , c language use call by value to pass the argument.

Call by value

- Calling a function with parameters passed as values

```
int a=10;                    void fun(int a)
fun(a);                      {
                                     defn;
                             }
```

Here fun(a) is a call by value.
Any modification done within the function is local to it and will not be effected outside the function

Example :-

```
Void swap(int , int);
Void main()
{
        Int a=5,b=10;
        Clrscr();

Printf("before swapping a=%d , b=%d",a,b);
        Swap(a,b);
Printf("after swapping a=%d,b=%d",a,b);

        Getch();
}
```

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```
Void swap (int x , int y)
{

        Int  temp;
        temp  =x;
        x=y;
        y=temp;
        Printf("x=%d",x);
        Printf("\ny=%d",y);
}
```

2. Call by Reference :-

- In call by reference the address of real argument will be passed toformal argument.
- So that the changes made to formal arguments wil be reflect thereal argument.

Call By Reference

- Calling a function by passing pointers as parameters (address of variables is passed instead of variables)

```
int a=1;                 void fun(int *x)
fun(&a);                 {
                                 defn;
                         }
```

Any modification done to variable a will effect outside the function also

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Example :-

```
 Void swap(int *, int *);
Void main()
 {
        Int a=5,b=10;
        Clrscr();
         Printf("before swapping a=%d , b=%d",a,b);
        Swap(&a,&b);
         Printf("after swapping a=%d,b=%d",a,b);
        getch();
}

 Void swap (int  *x , int *y)
{

         Int temp;
        temp =*x;
         *X=*y;
         *Y=temp;
        printf("x=%d",*x);
        printf("\ny=%d",*y);
}
```

Q-7 Explain Recursion with example.

Detail :-

- In c language , Recursion is a process of repeating the value number of times.
- In programming language ,recursion means when the function call itself again and again.

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- But in recursion function programmer have to mention ,when to exit.
- You have to use same name when calling the function.

RECURSION

When a called function in turn calls another function a process of chaining occurs. Recursion is a special case of this process, where a function calls itself.

Example :

```
void main ()
{
printf ( " \n This is an example of recursion");
main ( ) ;          ←————  Recursive function
                            call
}
```

Recursive Definitions

- Recursion: solving a problem by reducing it to smaller versions of itself
- 0! = 1   (1)
  n! = n x (n-1)! if n > 0   (2)
- The definition of factorial in equations (1) and (2) is called a recursive definition
- Equation (1) is called the base case
- Equation (2) is called the general case

C++ Programming: From Problem Analysis to Program Design, Third Edition   3

return 5 * factorial(4) = 120
  └── return 4 * factorial(3) = 24
      └── return 3 * factorial(2) = 6
          └── return 2 * factorial(1) = 2
              └── return 1 * factorial(0) = 1

javaTpoint.com

1 * 2 * 3 * 4 * 5 = 120

Fig: Recursion

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Example :-

```
Void  rec(int);
Void main()
{
        Printf("enter number");
    Scanf("%d",&n);
     rec(n);
     getch();
}
Void rec(int n)
{
    n++;
    if(n>5)
    {
         Printf("%d\n",n);
      rec(n);
    }
}
```

1 Word Question – Answer

1	when the function call itself again and again ,the process is called _____	recursion
2	The function being called again by itself is called _____	Recursive function

Q-8 Explain different storage classes.

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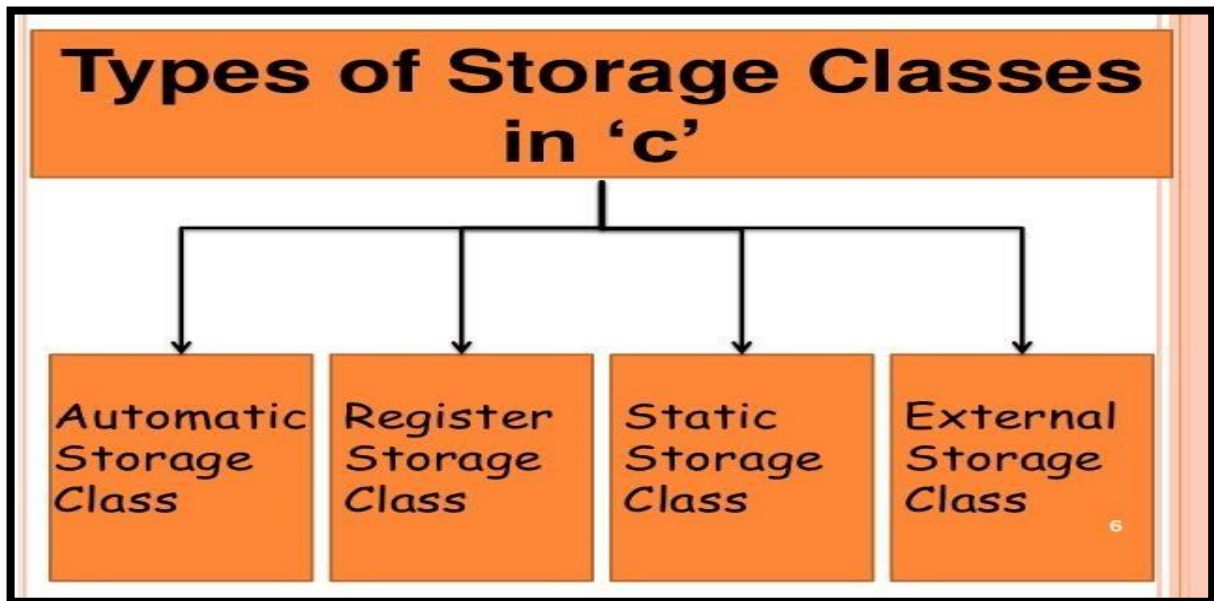
Detail :-

- In c language , Storage class is used to decide storage of memory for particular variable.
- It is used to decide the scope of variable.

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- There are four storage classes available in c.
  - Automatic Storage class
  - Register Storage class
  - Static Storage class
  - External Storage Class

1. **Automatic Storage Class:**

- A variable that declare inside function block is called automatic variable.
- It must be declare using auto keyword.

  - ✓ **Keyword** : auto
  - ✓ **Storage Location** : Main memory
  - ✓ **Initial Value** : Garbage Value
  - ✓ **Life** : Local (function in which it is declared).
  - ✓ **Scope** : Local to the block in which variable is declared.

Storage Class	Declaration Location	Scope (Visibility)	Lifetime (Alive)
auto	Inside a function/block	Within the function/block	Until the function/block completes
register	Inside a function/block	Within the function/block	Until the function/block completes
extern	Outside all functions	Entire file plus other files where the variable is declared as extern	Until the program terminates
static (local)	Inside a function/block	Within the function/block	Until the program terminates
static (global)	Outside all functions	Entire file in which it is declared	Until the program terminates

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Example:

```
#include <stdio.h>
#include <conio.h>
void main()
 {
       auto int i=10;
       clrscr();

              {

                      auto int i=20;
                      printf("\n\t %d",i);

              }
                      printf("\n\n\t %d",i);
              getch();
       }
```

2. External Storage Class:
- This variable can be declare outside the function (extern).
- The extern variable can be declare using extern keywords.

  ✓ **Keyword** : extern
  ✓ **Storage Location** : Main memory
  ✓ **Initial Value** : Zero
  ✓ **Life** : Until the program ends.
  ✓ **Scope** : Global to the program.

  Example:
```
#include <stdio.h>
#include <conio.h>
extern int i=10;
```

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```
void main()
{
        int i=20;
        void show(void);
        clrscr();
        printf("\n\t %d",i);
        show();
        getch();
}
void show(void)

{
        printf("\n\n\t %d",i);

}
```

3. **Static Storage Class:**
    • This variable can be declare inside the function and local to the block in whichit is declare.
    • Static variable can be declare using static keyword.

    ✓ **Keyword :** static
    ✓ **Storage Location** : Main memory
    ✓ **Initial Value**: Zero and can be initialize only once.
    ✓ **Life** : depends on function calls and the whole application orprogram.
    ✓ **Scope** : Local to the block.

    Example:
    ```
    #include<stdio.h>
    #include<conio.h>
    void print();
    void main()
    ```

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```
{
        clrscr();
        print();
        print();
        getch();
}
void print()
{
            static int k;
            printf("\n the value of static variable is %d",k);
            k++;

}
```

4. **Register Storage Class:**

- This variable can be declare inside the function as well as outside the function.
- The scope of this variable is global.
- It is declare using register keyword.
  - ✓ **Keyword** : register
  - ✓ **Storage Location** : Register Memory
  - ✓ **Initial Value** : Zero
  - ✓ **Life** : Until the program ends.
  - ✓ **Scope** : Global to the program.

Example:
```
#include<stdio.h>
#include<conio.h>
void main()
{
        clrscr();
        register int i;
```

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```
for(i=0;i<=4;i++)

{
    Printf("%d\n",i);
}
getch();
}
```

1 <mark>**Word Question – Answer**</mark>

1	How many types of storage classes available in c?	4
2	The register storage class can be declare using _____keyword.	Register
3	Storage location of static storage class is _____.	Main memory
4	The initial value of external variable is_____.	
5	The scope of automatic variable is _____to the block where it is declared.	

Q-9 Explain How to Pass and How to return argument or value.

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Detail :-

When a function passes and returns value of variables then that function is known as **'function call by passing and returning values.'**

Example:

```
#include <stdio.h>
#include<conio.h>
int number(int n)
{
        return n;
}
void main()
{

int number(int);
```

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```
        int a = number(4);

        clrscr();
            printf("\n Number is : %d",a);
          getch();
    }
```

Q-10 Give difference between Malloc() and Calloc().

malloc()	calloc()
1. malloc() has only oneargument. 2. malloc() allocates singleblock of storage space 3. malloc() gives the garbage value of memory	1. calloc() has two arguments. 2. calloc() allocates multipleblocks of storage space. 3. calloc() initializes thememory to zero.

Q-11 Give difference between Call by value and Call by reference.

Call by value	Call by reference
1) In call by value the real argument will remain unchanged.	1) In call by reference the realargument can be easily modified.
2) In call by value copy of argument will be passed.	2) In call by reference ,addressof argument can be passed.
3) In this process ,user canpass the value.	3)In this process , user can pass address or reference.

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SUMMARY QUESTIONS OF CHAPTER -3

ONE - MARK QUESTIONS

- ✓ What is Function?
- ✓ Give Full Form of UDF.
- ✓ List out Types of UDF.
- ✓ Which Operator is used to declare Pointer Variable?
- ✓ List out different Memory Allocation Functions.
- ✓ Write down Syntax for Realloc()

TWO - MARK QUESTIONS

- ✓ Explain any two String Functions with Example.
- ✓ Explain any two Maths Functions with Example.
- ✓ Explain any two Date & Time Functions with Example.

THREE - MARK QUESTIONS

- ✓ Explain Recursion with suitabale Example.
- ✓ Explain any three I/O Formatting functions with Example.
- ✓ Explain Free() , Exit() ,atof() ,atol() with Example.
- ✓ Give difference between Malloc() and Calloc().

FIVE - MARK QUESTIONS

- ✓ Explain any six Miscellaneous Functions with Example.
- ✓ Explain Pointer with Suitable Example.
- ✓ Explain Call by Value and Call by Reference with Example.
- ✓ Write note on different Storage Classes.
- ✓ Explain User Define Function with Example.

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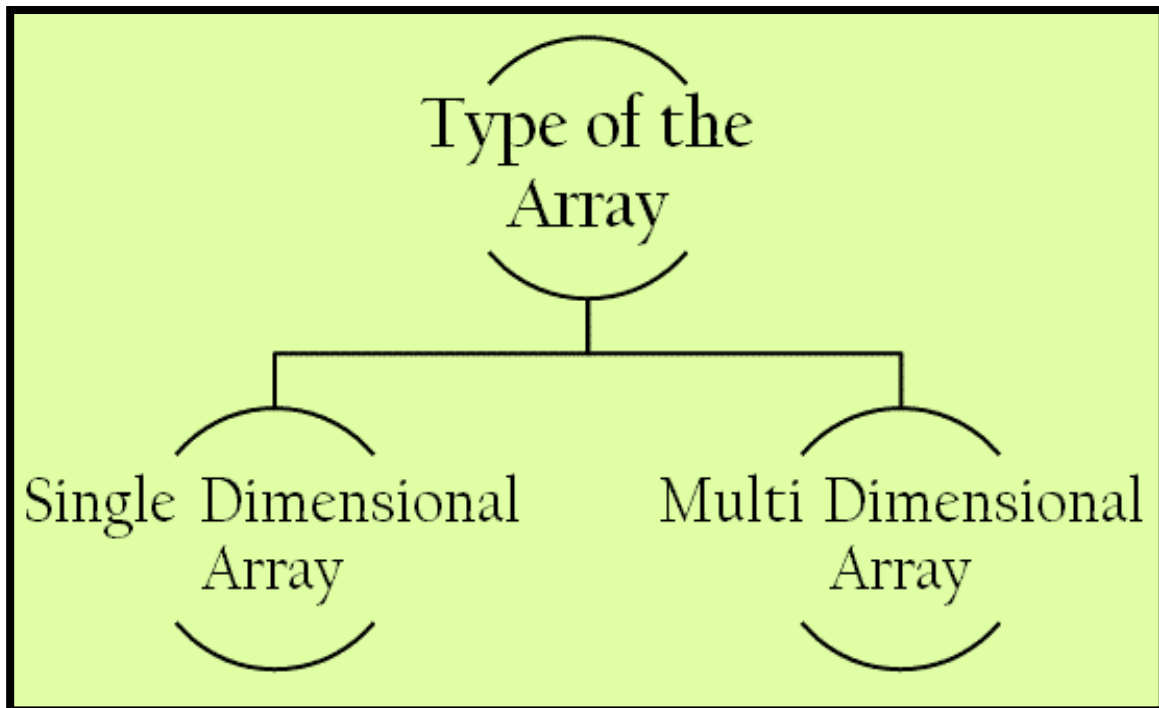| 2 – Vaishalinagar	3 – Vaishalinagar
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CHAPTER-4

ARRAY & POINTERS

- Types of arrays
  - Single Dimensional Array
  - Two Dimensional Array or Multi-Dimensional Array
  - String Arrays
- Use of arrays in Programming
- Arrays and matrices
- Introduction of Pointers
- Use of pointers in Dynamic Programming
- Pointer to Variables
- Pointer to Array
- Pointer within Array
- Pointer To Structure
- Pointers within structure
- Pointer to Pointer

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Q-1 What is Array ? Explain with types.

Detail :-

- Array is a group of elements that all have same data type.

- It is a data structure that can store multiple values at the same time in singlevariable.

✓ **How to declare array:- [1 mark]**

  ▪ Array can be declare at design time and at run time.
  ▪ To declare array , C language provide 3 criterias:
  - (i)   Name of Array
  - (ii) Size of Array
  - (iii) Type of Array

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<u>Ex :- int a[3];</u>

❖ **<u>Types of Array :-</u>**

▪ Array can be of following types:

(i) One dimension array (1 - D)

(ii) Two dimension array (2 - D)

(iii) Multi dimension array (M – D)

✓ **<u>One dimension array (1 - D) :-</u>**

▪ 1 – D means if we provide only one dimension (one square bracket) withsize.

<u>Syntax</u> :- <data type> <array name> [size of array]

<u>Example</u> :- int a[5];
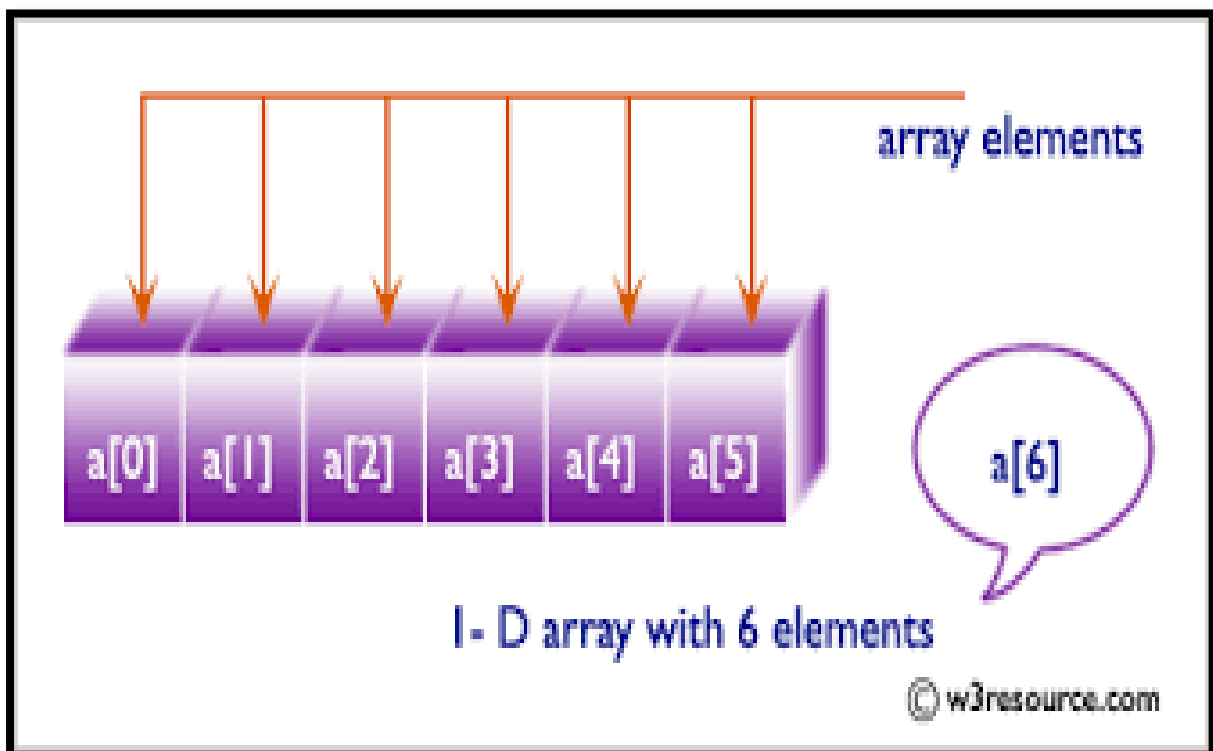
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Name	roll[0]	roll[1]	roll[2]	roll[3]	roll[4]	roll[5]	roll[6]	roll[7]
Values	12	45	32	23	17	49	5	11
Address	1000	1002	1004	1006	1008	1010	1012	1014

1-D Array memory arrangement

✓ **Two dimension array (2 - D) :-**

▪ In 2 – D array ,we have to provide two dimenstions (two square brackets)with size.

▪ One bracket for row & other bracket for column

▪ We can create table , matrix using 2- D array.

Syntax :- <data type> <array name> [size of row] [size of column]Example :- int a[3][3]

TWO DIMENSIONAL ARRAY

Also referred to as a *table*, a two dimensional array has two indexes. The first index refers to the row, while the second refers to column. The syntax in declaring two-dimensional arrays in Visual C++ is:

<data type> <array name> [<row size>] [<column size>]

In a two-dimensional array, the array elements are arranged in row-major order.

int a [4] [3] = { {1. 2. 3}. {4. 5. 6}. {7. 8. 9}. {10. 11. 12}} :

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

MELJUN CORTES, MBA,MPA,BSCS

✓ **Multi dimension array (M - D) :-**

▪ M-D represented by more than 2 brackets at the same time with size.

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Syntax :- <data type> <array name> (<size 1>) (<size 2>)….(size N)

Example :- int a[3][3][3]

1 Word Question – Answer

	QUESTION	ANSWER
	What is Array?	Group of Elements having same name and type.
2	Array is_____datatype.	Derived
3	Array is used to represent _____	Collection
4	Types of array can be_____& _____	Single/One dimension& Multi/Two dimension

Q-2 Explain Array Initialization in brief.
Detail:

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✓ **Initialization of array elements:-**

- After definition and declaration of array now array elements must beinitialized.
- The two-dimensional array can be either initialized at :
    1. Compile time(at the time of declaration)
    2. Run time (using scanf statement or using assignment operator)

Compile time initialization

Example :

        int number[ ] = {1,2,3,4};

- The character array can be initialized as follows :

        char name[ ] = {'j','o','h','n','\0'};

- The character array can also be initialized as follows :
        char name[ ] = "john";

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1. **Initialization of array at compile time:-**

- In this type of initialization, the array elements can be initialized at thetime of declaration.
- The values are assigned to each array elements enclosed within braces andseparated by comma.

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Example:-

data_type array_name[2] [3]={{1,2,3},{4,5,6}};

column1   column2   column3

1	2	3

2.   **Initialization of array at run time:-**

Run time initialization :

- In run time initialization, the array is explicitly initialize at run time.
- This concept generally used for initializing large arrays.
- Example:

```
for(i=0; i < 100; i++)
{
        if( i < 50)
        sum[i] = 0.0;
        else
        sum[i] = 1.0;
}
```

- Here first 50 elements of the array sum are initialized to 0 and the remaining 50 elements are initialized to 1 at run time.

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- For initialization of two-dimensional array, we need nested for loops.
- The loop with counter i is used for row and the loop with counter j is usedas columns.
- Initially, the value of i=0, which indicates the row 0 and the inner loop reads the values for the elements in each column in the row 0. It continues till the rows complete.
- Firstly declare an array int a[3][3] which will contain total (3*3=9) elements.. Now, using for loop we access the elements of this array as:

```
for(i-0;i<3;i++)
{
for(j=0;j<3;j++)
{
printf("\n enter elements a[%d][%d]",i,j);
scanf("%d",&a[i][j]);

}
}
```

- The elements of array will ne initialized using the for loop under:-
- Initially the value of i=0, so the value of a[0] will be scanned first using the scanf statement and likewise the loop executes for values upto a[4].
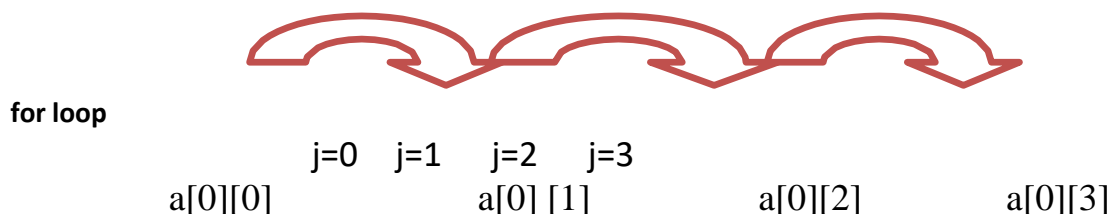
for loop

    j=0   j=1   j=2   j=3
a[0][0]   a[0] [1]   a[0][2]   a[0][3]

1 Word Question – Answer

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SR.NO.	QUESTION	ANSWER
1	If array elements are initialized at the time of declaration then it is called _____ initialization.	Compile time
2	If array elements are initialized at the runtime then it is called _____ initialization.	Runtime
3	In _____ array initialization We have to assign fix value or size compulsory.	Compile time
4	Run time initialization of array is suitable for initializing _____ array.	Large

Q-3 Explain Array Initialization in brief.

Arrays of Strings

- String is array of characters.
- Thus an array of string is 2-D array of characters.
- E.g.

  char names[5][10];

- Here, names[5][10] means 5 names having 10 characters each.

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Detail :-

- The array of character is implemented in c which is known as string.
- The declaration of string array or character array can be
  like :Char str[5] = { 'a','b','c','d','e','\0'}
- A NULL char '\0' must be added at the end of array string.
- The character array need one more space to store NULL char.
- C also provide facility to declare character array without specifying number of elements.
- In this case array size will be declare automatically.

✓ **String Array Memory Allocation :-**


```
char name[6] = { 'T', 'O', 'M', 'M', 'Y', '\0' };
char name[ ] = "TOMMY"
```

T	O	M	M	Y	\0
65120	65121	65122	65123	65124	65125

→ Memory Locations

❖ **Example:**

1 Byte
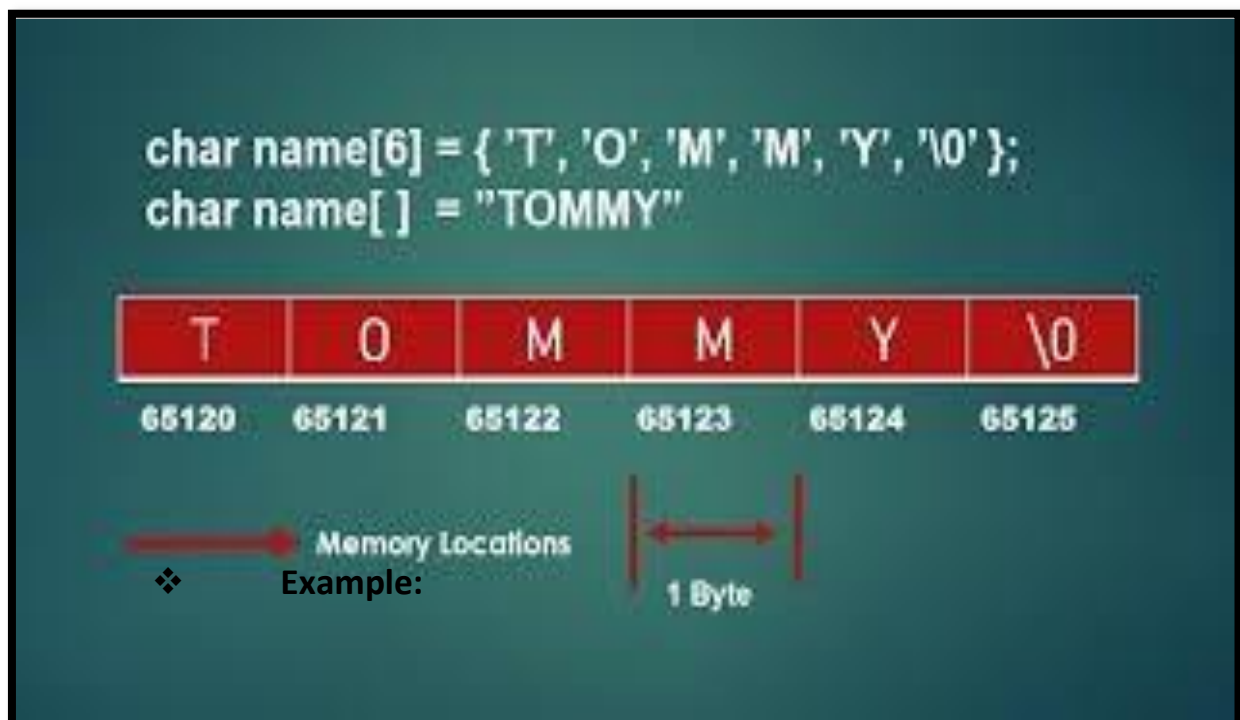
```
#include<stdio.h>
#include <conio.h>
```

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```
void main()
{
    clrscr();
    char arr[3][12]= { "Rose", "India", "technologies" };
    printf("Array of String is = %s,%s,%s\n", arr[0], arr[1], arr[2]);
 getch();
}
```

Output:

Array of String is=Rose, India, technologies

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	String array is_____array of characters	2-D
2	String is array of _____object.	Char
3	Write down statement to declare string array	Char arr[3][12]
4	String array represent_____ and _____.	Array size Total number of characters

Q-4 Explain Array with matrix.

Detail :-

- Array of Array is known as 2 – D array.
- 2-D array in C is also known as Matrix.
- Two dimensional array or multi-dimensional array are used to represent data in matrix form.
- Suppose , We declare array like a[3][3] then Matrix can be store as array like following:

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← i ──→ row ──────→			a [i][j]
a [0][0]	a [0][1]	a [0][2]	a [i][j]
a [1][0]	a [1][1]	a [1][2]	element
a [2][0]	a [2][1]	a [2][2]	
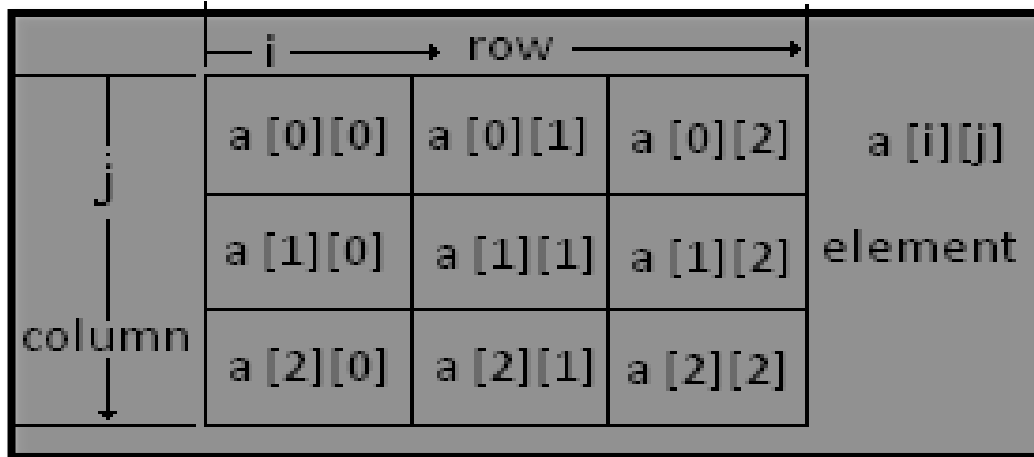
Syntax:

<data-type> <array_nm> [row_subscript][column-subscript];Example:

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

void main()
{
        int a[3][3], i, j;
      clrscr();
      printf("\n\t Enter matrix of 3*3 ");

      for(i=0; i<3; i++)
      {
            for(j=0; j<3; j++)
            {
                    scanf("%d",&a[i][j]);  //read 3*3 array
            }
      }
```

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```
    printf("\n\t Matrix is : \n");
    for(i=0; i<3; i++)
    {
            for(j=0; j<3; j++)
            {
                    printf("\t %d",a[i][j]);  //print 3*3 array
            }
        printf("\n");
    }
    Getch();
    }
```

SR.NO.	QUESTION	ANSWER
1	Matrix can be represented by_____ array.	2-D
2	In Array of Matrix elements can be represented by____and____.	Rows Columns

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Q-5 What is pointer ? How to create pointer?

WHAT IS POINTER?

- A **pointer** is a variable whose value is the address of another variable, i.e., direct address of the memory location. Like any variable or constant, you must declare a pointer before you can use it to store any variable address.
- The general form of a pointer variable declaration is:

  dataType *var_name;

- Here,
  - **dataType** is the pointer's base type; it must be a valid C data type(i.e., int, float, char etc).
  - **var_name** is the name of the pointer variable.
  - The asterisk * you used to declare a pointer is the same asterisk that you use for multiplication. However, in this statement the asterisk is being used to designate a variable as a pointer.
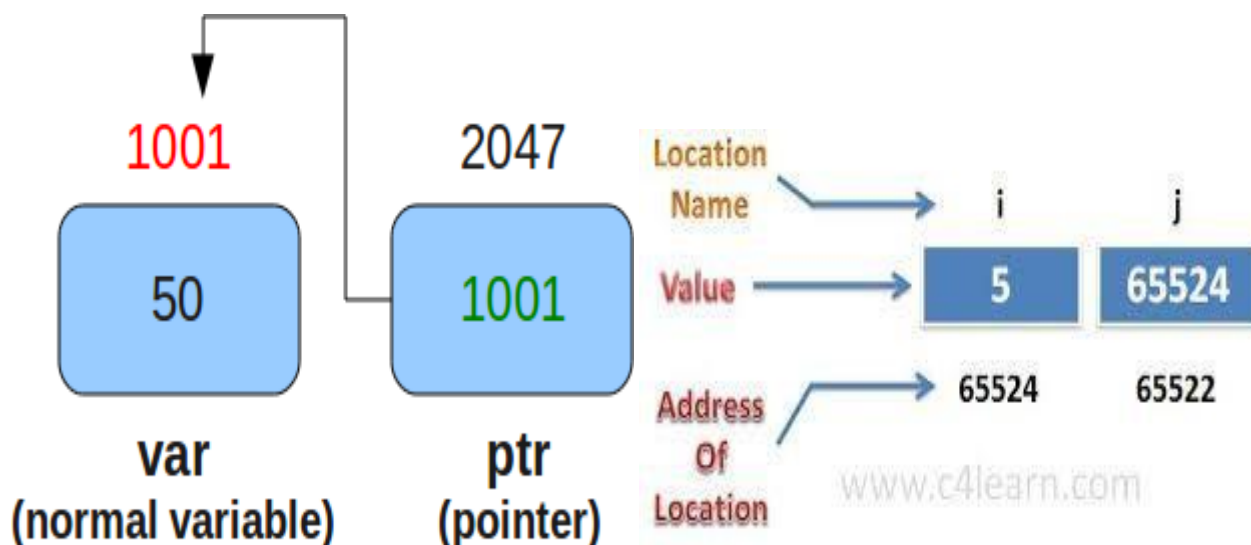
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Detail :-

- Pointer is the variable that stores the address of another variable.
- Pointer is used to point out memory address.
- The pointer has three main concepts:

1) **Pointer constant:-**
   - In computer memory, memory addresses are known as pointerconstant. One can not change its value, it can only be used.

   Example: *house number.*

2) **Pointer value:-**
   - The pointer value means the *address of another variable.*
   - We can not access the value of memory address directly.
   - If wewant to access then we have to use & operator and
     * operator
     Example: int a;

     &a is known as pointer value.

3) **Pointer Variable:-**
   - The variable which stores the pointer value is known as pointer variable.

   Example

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

   void main()
   {
   ```

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```
            int a;
            int *p;
             clrscr();
            p=&a;
            printf("\n %u",p); //will print address of a
            printf("\n %d",*p); // will print value of a
            getch();
        }
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	_____is a variable whose value is address of another variable.	pointer
2	Pointer variable can be declare using _____	* (asterisk)
3	The general form of declaring pointer variable is_____	Datatype *<variable name>
4	_____operator is used to store address of any variable	&

Q-6 What is pointer to variable? Explain with Example.

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C Pointer Variables

To declare a pointer variable, we must do two things

- Use the "*" (star) character to indicate that the variable being defined is a pointer type.

- Indicate the type of variable to which the pointer will point (the pointee). This is necessary because C provides operations on pointers (e.g., *, ++, etc) whose meaning depends on the type of the pointee.

- **General declaration of a pointer**
  ```
  type *nameOfPointer;
  ```

1/14/10

Pointer Declaration

- **Type * Varname;**
  declares **Varname** as a pointer to **Type**

- Examples

  A is a pointer to a character

  B is a pointer to an integer

  ```
  char* A;
  int* B;
  struct node * Root;
  ```

  Root is a pointer to a node structure

- * associates with the variable name

  ```
  char *A, B;
  ```

  A is a pointer to a character

  B is a character !

  Pg. 9

Detail :-

- Variable means you can store particular value.
- Pointer is also one type of variable but the main difference

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between simple variable and pointer variable is that ;
- o Simple variable can store only the value.
- o Pointer Variable can store address of another variable.
- In short, Pointer to variable means a variable that store pointer value.
- You can declare pointer variable using * (asterisk) and you can store address of pointer using &(ampersand).

Example:

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

        void main()
        {
            int a=10;
            int *p;
            clrscr();
             p=&a;
               printf("\n %u",p); //will print address of a
               printf("\n %d",*p); // will print value of a
               getch();
        }
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	_____ is a variable whose value is address of another variable.	pointer
2	Pointer variable can be declare using _____	* (asterisk)
3	The general form of declaring pointer variable is _____	Datatype *<variable name>
4	_____ operator is used to store address of any variable	&

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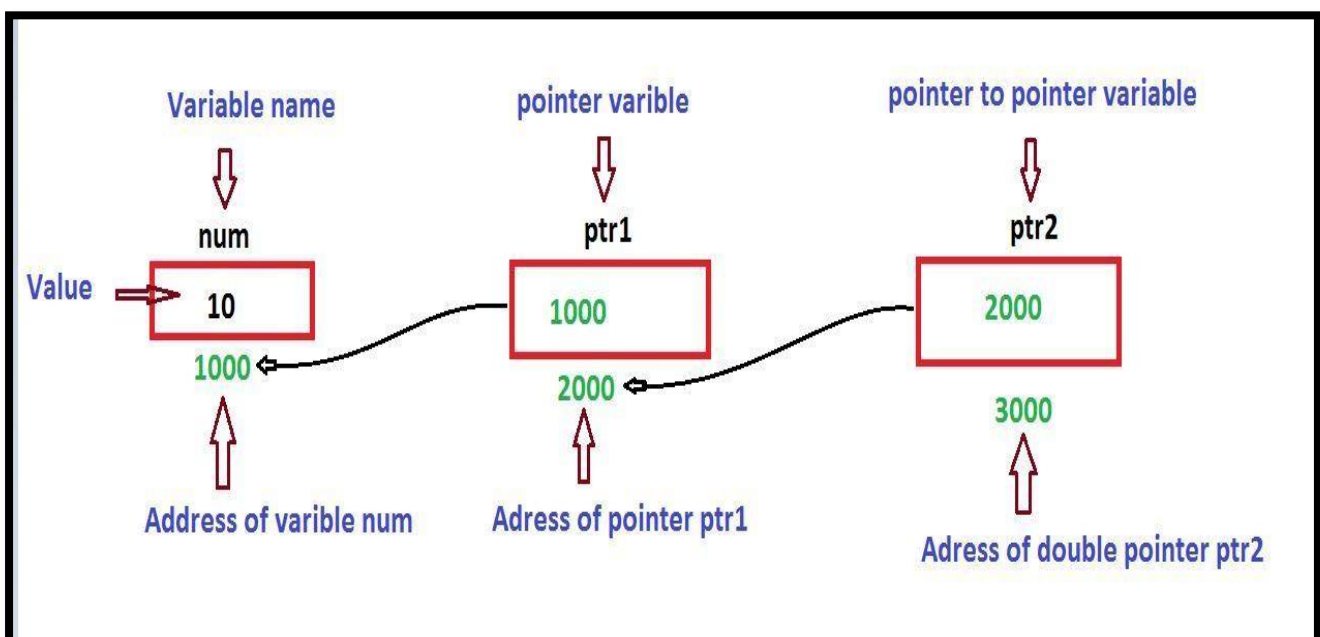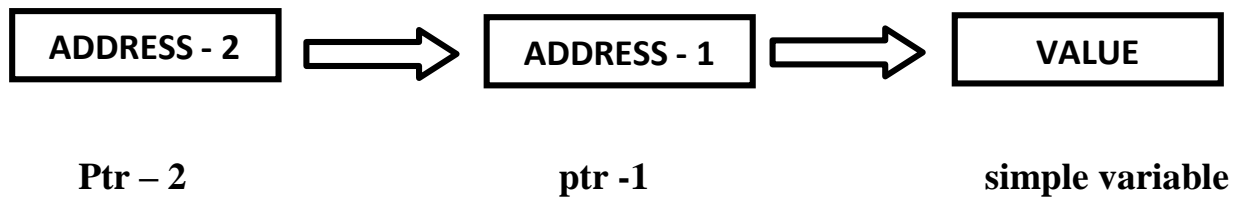## (AFFILIATED TO SAURASHTRA UNIVERSITY)

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Q-7   What is Pointer to Pointer? Explain with Example.

Detail :-

- In C Programming it is also possible that pointer variable is pointed by anotherpointer variable.
- This process is called pointer to pointer.

ADDRESS - 2	⟹	ADDRESS - 1	⟹	VALUE

Ptr – 2	**ptr -1**	**simple variable**

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- Pointer variable ptr-2 having the address of ptr-1 ,same way ptr-1 having the address of simple variable(a).
- This process is known as multiple indirection.
- Pointer to pointer variable must be declare using additional indirection operation(**) in front of variable name like ;
    Int **p;

Example:

```
#include<stdio.h>
#include<conio.h>
void main()
{
        int a=10;
        int  *p;
         int **a;
        clrscr();
        p=&a;
        a=&p;
         clrscr();
      printf("\n value of p = %d",*p); //will print address of a
      printf("\n address of p=%d=u",p); // will print value of a
      printf("\n value of a = %d",*p);
      printf("\n value of **a=%d",**a);getch();
}
```

<mark>**1 Word Question – Answer**</mark>

SR.NO.	QUESTION	ANSWER
1	If pointer variable is pointed by another pointer variable then it is called _____	Pointer to pointer

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2	A variable that is pointer to pointer must be declared using_____.	additional indirection (**)
3	_____operator can be used to access members of the structure using pointer.	-> (arrow)
4	The another pointer variable can contains _____of first pointer variable.	address

Q-8 What is Pointer to Array? Explain with Example.

Array of Pointer

int a [ ] = {10,20,30,40};

int *p[4];   // *p[0], *p[1], *p[2], *p[3]

2886728	2886732	2886736	2886740
10	20	30	40
a[0]	a[1]	a[2]	a[3]

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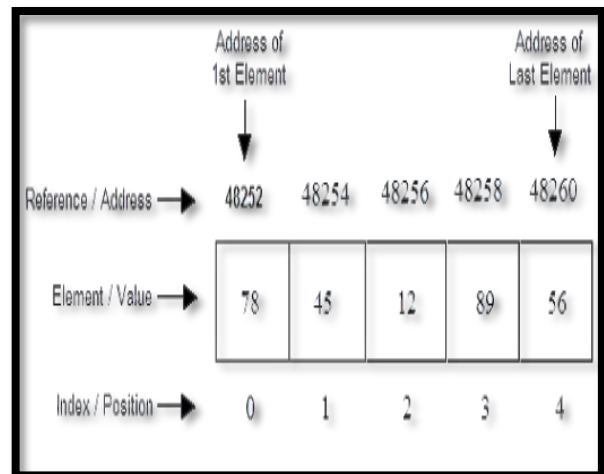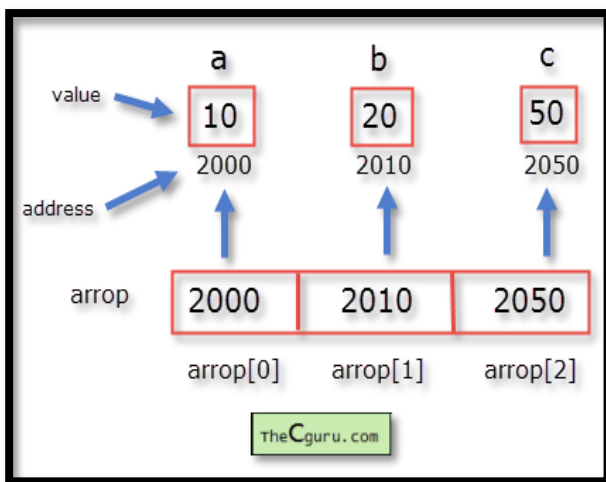
Detail :-

- When array is declared ,compiler decide the memory to store array elements.
- Pointer to array is used to store whole array into single pointer variable.
- We can declare pointer to array like following :

    Int a[5];
    Int *p;
    P=a;
    P=&a[0];

- For Example , you can store each elements of array which can be point out bypointer.
- The array elements using pointer can be store like following ;

Elements	10	20	30	40	50
Array Index	a[0]	a[1]	a[2]	a[3]	a[4]
Pointer	p	p+1	p+2	p+3	p+4

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Address	1000	1002	1004	1006	1008

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	_____ is used to point to zero element of the array using pointer.	P=&a[0]
2	If p point to particular element of array then _____ represent next element of array.	P+1

Q-9 What is Pointer to Structure? Explain with Example.

Pointer to Structure

- A structure type pointer variable can be declared as:

```
struct book
{
char name[20];
int pages;
float price;
};
struct book *bptr;
```

- However, this declaration for a pointer to structure does not allocate any memory for a structure but allocates only for a pointer, so that to access structure's members through pointer **bptr**, we must allocate the memory using **malloc()** function.
- Now, individual structure members are accessed as:

bptr->name	bptr->pages	bptr->price

OR

(*bptr).name	(*bptr).pages	(*bptr).price

- Here, -> is called arrow operator and there must be a pointer to the structure on the left side of this operator.

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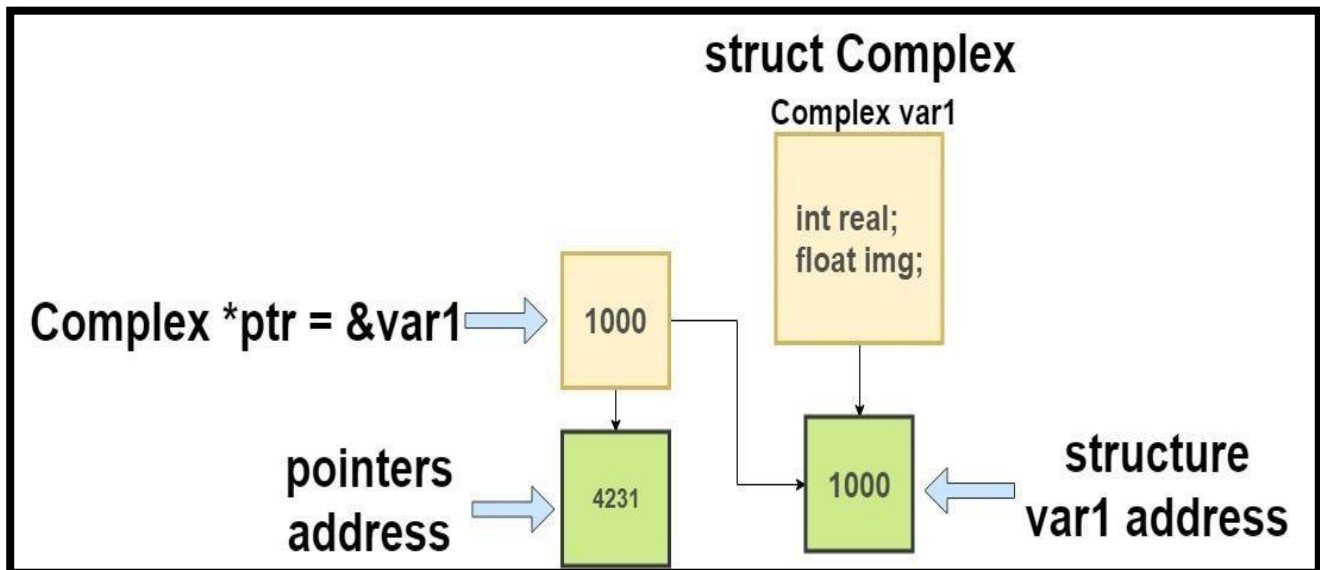
Detail :-

- Structure is a data structure that support group of elements that can be of different data types.
- We can easily use pointer with the structure.
- To access elements of structure (members) ->(arrow) operator can be used.
- Pointer to structure can allocate memory dynamically.
- Pointer must be declare before it is used.

Example:

```
#include<stdio.h>
#include<conio.h>
Struct stud
{
        Int rno;
        Char nm[20];
}s;
```

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```
void main()
{
Struct stud *p;
P=&s;
Clrscr();
s.rno=1;
printf("rno=%d",p->rno);
 getch();
}
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	The general form of defining structure to pointer is_____	Struct stud *p
2	Pointer to structure can also allocate memory	Dynamically
3	_____operator can be used to access members of the structure using pointer.	-> (arrow)

Q-10 Explain Memory Allocation of Structure.

Detail :-

- The total memory occupied by structure can be the total size of each member.
- We can also use size of operator to get memory allocation of structure.
- For example : consider that we have following structure:

Struct student

> {

> **Int rno;**

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Float salary;

Char nm[20];

}s;

- In above structure it have 3 members:

        Int rno ; - 2 bytes
        Float salary ; - 4 bytes
        Char nm[20] ; - 20 bytes

- Total 26 bytes will be occupied by structure student in the memory.

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SUMMARY QUESTIONS OF CHAPTER -4

ONE - MARK QUESTIONS

- ✓ What is Array?
- ✓ List out Types of Array.
- ✓ How to declare String Array in C?
- ✓ Write down different uses of Array.(OR benefits)
- ✓ What is Pointer ?
- ✓ List out uses of Pointer.(Advantages).
- ✓ Which operator is used to represent Pointer to Pointer.
- ✓ How to Declare Pointer Variable?

TWO - MARK QUESTIONS

- ✓ Explain Two Dimension Array with Example.
- ✓ Explain Array with Structure by Example.
- ✓ Explain Array within Structure by Example.
- ✓ Explain Pointer to Pointer with Example.

THREE - MARK QUESTIONS

- ✓ Explain Array and Matrices with suitabale Example.
- ✓ Write note on Pointer and Structure with Example.
- ✓ Write note on Pointer to Array.

FIVE - MARK QUESTIONS

- ✓ Explain Array with different types.
- ✓ Explain Pointer with reference to Dynamic Programming.
- ✓ Explain Pointer within Array with Example.

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CHAPTER-5

USER DEFINED DATA TYPE – STRUCTURE , UNION & ENUM

& FILE HANDLING

- o What is structure ?
- o Initializations and declarations
- o Memory allocation functions
- o Pointers with structures
- o Array with structures
- o Udf with structures
- o Nested structures
- o Introduction to union
- o Difference between Structure & Union
- o Enumerated Data type
- o Concept of data files
- o File handling
- o Use of file handling functions
  - ▪ fopen, fclose, fprintf, fscanf, getw, putw, fseek,
  - ▪ ftell, rewind ,freopen, remove, rename, feof, ferror,
  - ▪ fflush, fgetpos, sprintf, snprintf, vsprintf, vsnprintf
  - ▪ fscanf, vfscanf, setbuf, setvbuf
- o I/O operations
- o Command line argument

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Q-1 What is structure? Explain initialization and declaration of structures.

Detail :-

- Structure is group /collection of multiple variables tht all have different Data type.
- The variables inside the structure are called members of structure.
- To declare structure in C language ,"struct" keyword can be used.

✓ **How to declare(initialize) structure with members:**

Syntax:

```
struct structure-tag
{
        datatype variable1;
        datatype variable2;
      datatype variable3;
}<Access Variable>;
```

Example:

```
struct emp
{
        int empid;
        char empname[20];
        float salary;
}e;
```

- The members of the structure cannot be accessed directly as other

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variables, as they are associated with a structure.

- The structure elements or member variables associated with the structure are accessed using the structure *member operator (.) also called the dot operator* which is used between the structure name and the member name.
- The members of the structure are accessed by two methods:

  1) Accessing the values using member operator (.)
  2) Accessing the values using scanf statement.

1. **Accessing the values using member operator (.):-**

Syntax:

Structure-variable **.** member-name=value;

↓

dot operator

Example:

Emp01.salary=10000;

2. **Accessing the values using scanf statement:-**

Syntax:

scanf("control string",&structure-variable . member-name);

Example:

scanf("%f",&emp01.salary);

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1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Structure is_____datatype.	User defined
2	Structure is a collection of _____ datatypes.	Different
3	_____ keyword is used to define structure.	Struct
4	The block of structure can be terminate with _____.	;(Semi colon)
5	To access member of the structure _____ opertator can be used.	.(dot)

Q-2. Explain Array and Structure.

Detail :

- Array and structure are related in two ways:

    1. Array of structure
    2. Array within structure

Array of structure...

- Two ways to declare an array of structure:

```
struct student
    {
    char name[20];
    int roll;
    char remarks;
    float marks;
    }st[100];
```

```
struct student
    {
    char name[20];
    int roll;
    char remarks;
    float marks;
    };
struct student st[100];
```

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1. **Array of structure:**

Detail :

- Array of structure means creating the array of the type struct.

   Example:. struct student s[5];

- If we want to access the members of the structure, it can be done in following way:-

   s[0].rollno   s[1].rollno
   s[0].marks[0]   s[1].marks[0]
   s[0].marks[1]   s[1].marks[1]
   .   .
   .   .   .
   s[0].marks[4]   s[1].marks[4]

2. **Array within structure:**

Detail :

- Array within structure means the array is used as member of the structure

   Example:

   struct student
   {
          int roll; member of structure

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int marks[5]; **// array within structure.**

};

marks[0] ⟶ marks of subject 1

marks[1] ⟶ marks of subject

Q-3 Explain Array within Structure with example.

- Array within structure is used to create multiple elements in the same time.
- If we want to store detail of students with multiple marks at that time array within structure can be used.
- Array within structure means we create array of particular member of structure.
- It is array within structure means array can be used as member of any structure.

Syntax: Struct <structure name>
```
{
    <datatype>       <variable 1>;
    <datatype>       <variable 2>[size];
}<access variable>;
```

Example:
Struct stud
```
{
              Int rno;
              Int marks[5];  //array within structure
```

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ARRAYS WITHIN STRUCRURES

- C permits the use of array as a structure members.
- We can use single or multi-dimensional array of type **int** or **float**.
- i.e.   Struct marks
  {
      int number;
      float subject[3];
  } student[2];

```
Struct student                    (Structure Of Array)
{
char name [40];
int roll;
int marks;
};
struct student s[100];            (Array of Structure)
```

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- The array of structure means to work with more than one elements at thesame time.
- If we want to store multiple records of multiple students at that time array ofstructure can be used
- Array of structure means creating array of every elements or members ofstructure.
- The array of structure can be represented by following manner.

Syntax:

```
Struct <structure name>

  {
       <datatype>       <variable 1>;

       <datatype>       <variable 2>[size];

  }<access variable>;
```

Example:

```
Struct stud
  {
          Int rno;
          Int marks;
  }                    s[10];     //array of structure
```

1- Word Question – Answer

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SR.NO.	QUESTION	ANSWER
1	Array of structure means creating array of type_____	Struct
2	Array within structure means array is used as _____of structure	Member
3	Write down statement to declare array within structure	Struct stud s { Int rno; Int marks[5]; }s;

Q-4 Explain Pointer with Structure with example.

Detail :

- Structure is the data structure which consists of group of elements that may or may not have same data type.
- First we can define the structure like following;

   Syntax:

```
struct student

{
       int roll;
       char name[20];
      char lname[20];

}struct student s1;
```

- Defining the pointer to structure

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struct student *p;

- It is already known that pointer must be initialized before it is used.
- Pointer to the structure can also be allocated memory dynamically.
- p=(struct student *)malloc(sizeof(struct student));
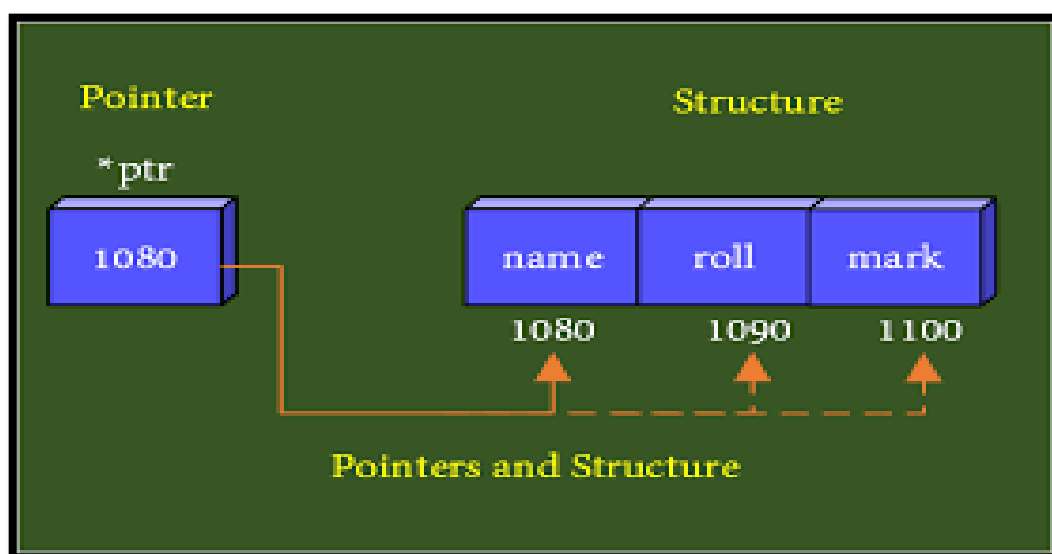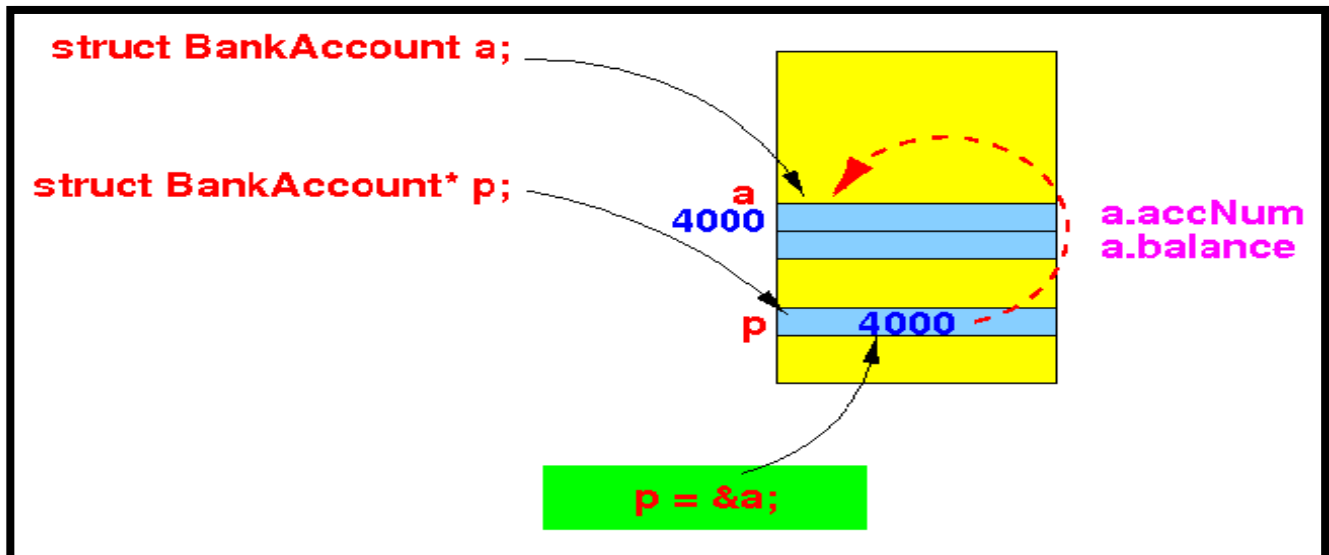
Pointers and Structure

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Example:

```c
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>

struct student
{
        int roll;
        char name[20];
        char lname[20];
}
 struct student s1;void main()
 {
        struct student *p;
p=&s1;
 clrscr();
s1.roll=1;
 strcpy(s1.name,"snehal");
strcpy(s1.lname,"pandya");
 printf("\n rollno=%d",p->roll);
  printf("\n name=%s",p->name);
 printf("\n lname=%s",p->lname);
 getch();
}
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER

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1	Pointer to structure can allocate memory _____.	Dynamically
2	In pointer to structure members can be access using_____operator.	->(arrow operator)
3	Write down statement to declare pointer with structure.	Struct stud *p;
4	In pointer with structure_____must be initialized before it is used.	pointer

Q-5 Explain UDF with Structure with example.

Detail :

- UDF stands for User Defined Function.
- UDF means the functions that are created by the user itself.
- It is also possible to pass structure as arguments to a function.
- When you create UDF with the help of structure then it is called UDF with structure.
- The following Example will display how to pass structure as argument in UDF.

Example:

```
#include<stdio.h> #include<conio.h>
struct data
{
    float amount;
     char fname[30];
    char lname[30];
}rec
void print_rec(struct data x)
{
    printf("\n %s %s %f",x.fname,x.lname,x.amount);
}
void main()
```

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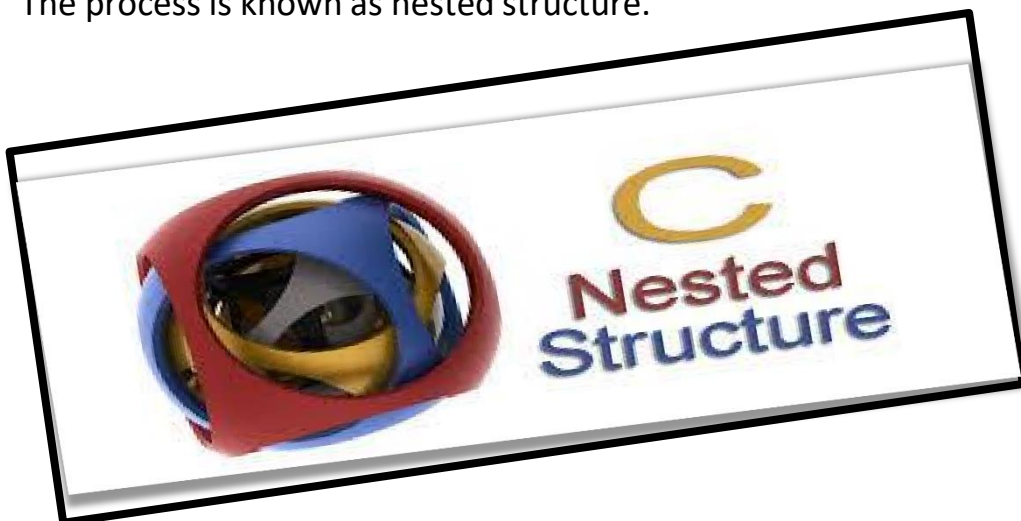|	
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```
{
     clrscr();
     printf("\n Enter the donor's first and last names");
     scanf("%s %s", rec.fname, rec.lname);
     printf("\n Enter the donation amount");
     scanf("%f",&rec.amount); print_rec(rec);
     getch();
}
```

Q-6 Explain Nested Structure with example.
Detail :

- Nested Structure means you can create one structure inside anotherstructure.
- In simple words, "**Structure within a structure"** is called nested structure**.**
- When the structure is declared as member of another structure then it iscalled structure within structure.
- The process is known as nested structure.

Syntax:

```
struct structure_nm
{
     <data-type> element 1;
```

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```
        <data-type> element 2;
        - - - - - - - - - - -
        - - - - - - - - - - -
        <data-type> element n;

        struct structure_nm
        {
                <data-type> element 1;
                    <data-type> element 2;
                    - - - - - - - - - - -
                    - - - - - - - - - - -
                    <data-type> element n;
            }inner_struct_var;
        }outer_struct_var;
```

Example :

```
struct stud_Res
{
    int rno;
    char nm[50];
   char std[10];

    struct stud
   subject
    {
   Char subname[30];
     Int marks;
    }subj;
}result;
```

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2 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Nested structure means_____.	Structure within structure
2	In nested structure , one structure can be declare as_____of another structure.	Member

Q-7 Briefly Explain Union.

Detail :

- The concept of union is similar to that of structures but differs in terms ofstorage space.
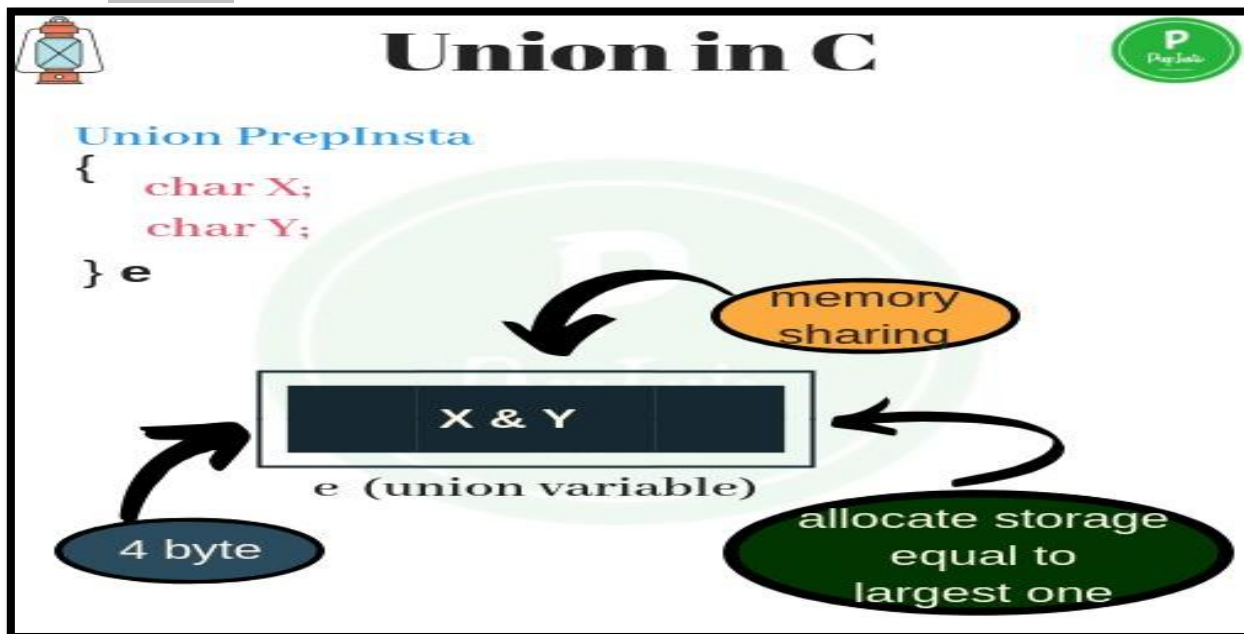
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- Union is declared and used in same way as the structures.
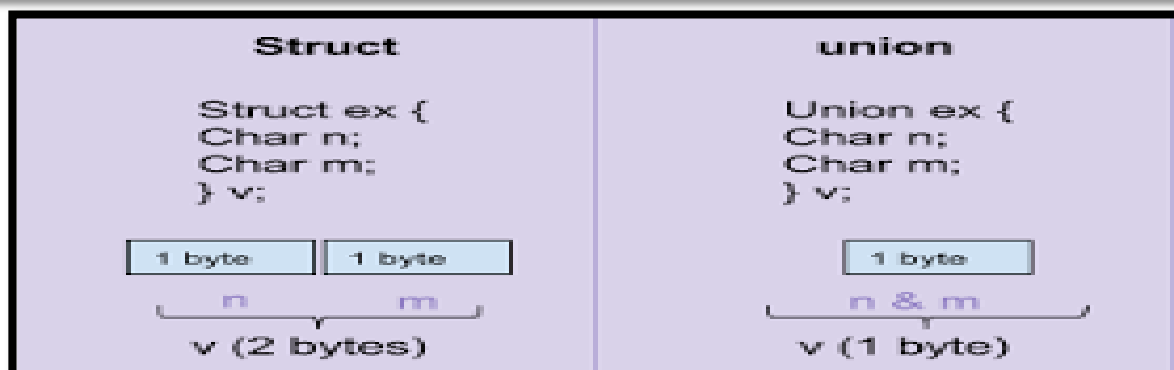
Syntax:-

keyword   union tag name

union union-tag
{
       datatype   variable1;
       datatype   variable2;
       datatype   variable3;
};terminating semicolon

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Example:-

```
union emp
{
        Char c;
        Float x;
}b;
```

Q-8 Give difference between Structure & Union.

Detail :

<u>Structure</u>	<u>Union</u>
1) In structure, each memberhave its own Storage Space.	1) In Union, All the members canshare Same Memory Space.
2)Structure can be declared using"struct" keyword.	2)Union can be declared using"union" keyword.
3)The size of structure depends onlength of its elements.	3)The size of union depends onmaximum length of integer elements.
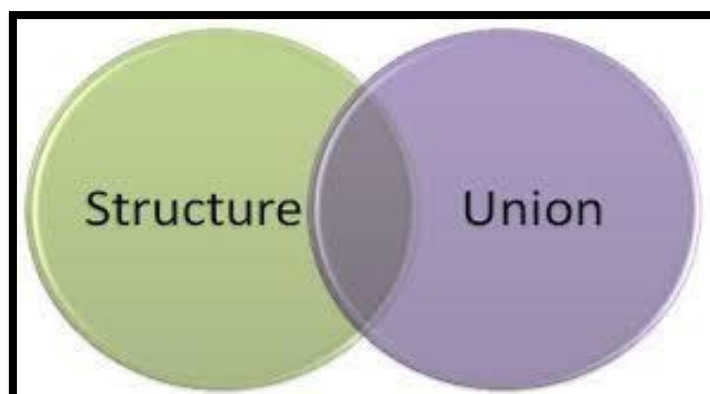
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Q-9 What is Data file? [1 mark]

Data File

▶ A **data file** is a computer file which stores data for use by a computer application or system.

▶ It generally does *not* refer to files that contain instructions or code to be executed (typically called program files), or to files which define the operation or structure of an application or system (which include configuration files, directory files, etc.);

▶ but to files that specifically contain information used as input, and/or written as output by some other software program.

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Detail :-

- Data file is used to store amount of informations permanently.
- Data file can be of 2 types:
  (1) Text file (.txt)
  (2) Binary file(.obj , .exe)

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	The types of Data file can be of _____ &_____ .	Text file & Binary file
2	The extension of binary file may be_____	.exe or .obj
3	Textfile saves data in the form of _____	ASCII Code

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4	The End of the file can be indicate using _____character.	NULL ('\0')

Q-10 What is File Handling?[1 mark]

Detail :-

- The process of accessing file from particular program is known as file handling.
- File handling also known as I/O (Input / Output).
- File handling include following operations :-
    - o Naming the file
    - o Opening the file
    - o Reading from the file
    - o Writing to the file
    - o Closing file

Files

- File – place on disk where group of related data is stored
    - E.g. your C programs, executables

- High-level programming languages support file operations
    - Naming
    - Opening
    - Reading
    - Writing
    - Closing

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C File Handling

1. Opening   – FOPEN("filename", "mode");
2. Closing   – FLCOSE(FP);
3. File Creation – Use File Modes "w", "w+", "a" and "a+"
4. File Reading – FGETC, FGETS, FSCANF
5. File Writing   – FPUTC, FPUTS, FPRINTF
6. File Seeking – FSEEK

1 Word Question – Answer

| SR.NO.	QUESTION	ANSWER
1		Text file & Binary file
2	To write data to the particular file , the filemust be open in_____mode.	Write (w)
3	_____is used to indicate end of the file	feof()
4	_____is used to set the file position to thebeginning of the file.	Rewind()
5	_____ function is used to return currentfile position.	Ftell()
6	_____ is used to return file position togiven location of the file.	Fseek()
7	_____is used to flushes all the filestreams.	Fflush()

Q-11 Explain different file modes.

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(a) Read Mode (b) Write Mode (c) Append Mode
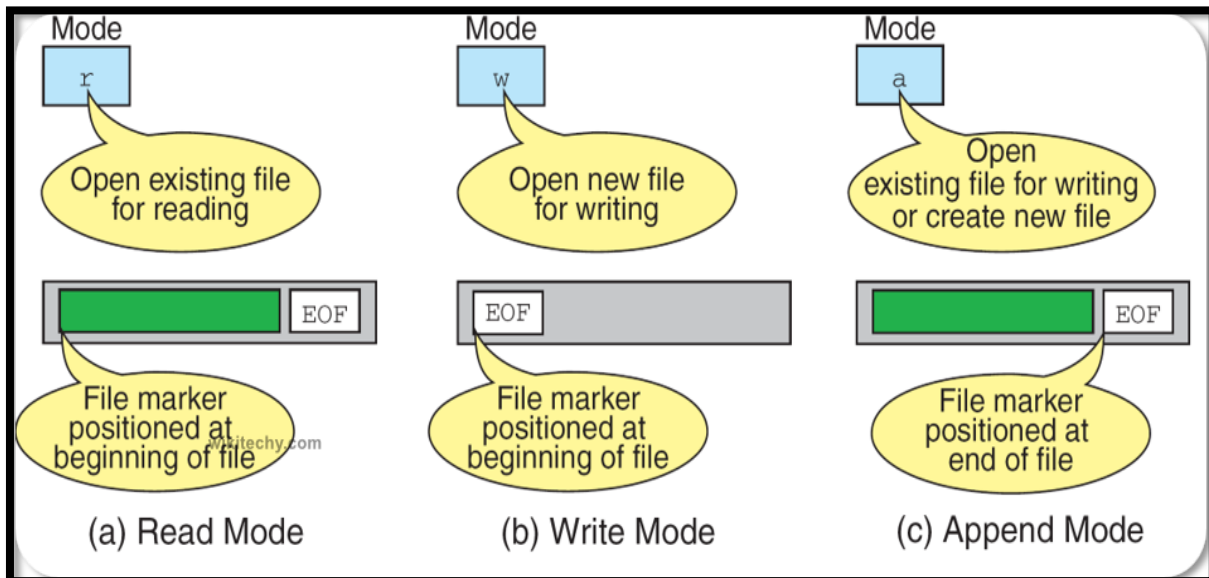
File Opening Modes

Mode	Meaning	Description
r	Read	Only reading possible. Not create file if not exist
w	Write	Only writing possible. Create file if not exist otherwise erase the old content of file and open as a blank file
a	Append	Only writing possible. Create file if not exist, otherwise open file and write from the end of file (do not erase the old content)
r+	Reading + Writing	R & W possible. Create file if not exist. Overwriting existing data. Used for modifying content
w+	Reading + Writing	R & W possible. Create file if not exist. Erase old content.
a+	Reading + Appending	R & W possible. Create file if not exist. Append content at the end of file

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Detail :-

- When user want to open any file , at that time following file opening modes are available for different purpose.

(1) "r" (read mode) :-
  o This mode search particular file.
  o If the file exist then load into the memory and read data from it.
  o If file does not exist then it will return "null".

(2) "w" (write mode) :-
  o This mode search particular file.
  o If the file exist then load into the memory and write data to it.
  o If file does exist then it will create new file automatically.

(3) "a" (append mode) :-
  o This mode search particular file.
  o If file exist then load into the memory and append it.
  o Otherwise it will create new file automatically.

(4) "r+" (Read & Write mode) :-
  o This mode search particular file.
  o If file exist then load into memory and allow you to read data firat and write new data.
  o Otherwise it will create new file automatically.

(5) "w+" (Write & Read mode) :-
  o This mode search particular file.
  o If file exist then load into the memory and allow you to write new data first and then read it.
  o Otherwise it will create new file automatically.

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(6)"a+" (Read , Write ,append & modify) :-

- o This mode search particular file.
- o If file exist then load into the memory and allow you to read , write ,append and modity.Otherwise it will create new file automatically.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1		Text file & Binary file
2	To write data to the particular file , the file must be open in_____mode.	Write (w)
3	_____is used to indicate end of the file	feof()
4	_____is used to set the file position to the beginning of the file.	Rewind()
5	_____ function is used to return current file position.	Ftell()
6	_____ is used to return file position to given location of the file.	Fseek()
7	_____is used to flushes all the file streams.	Fflush()

Q-12 Explain different file handling functions.

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Detail :-

File operation functions in C:

Function Name	Operation
fopen()	Creates a new file for use Opens a new existing file for use
fclose	Closes a file which has been opened for use
getc()	Reads a character from a file
putc()	Writes a character to a file
fprintf()	Writes a set of data values to a file
fscanf()	Reads a set of data values from a file
getw()	Reads a integer from a file
putw()	Writes an integer to the file
fseek()	Sets the position to a desired point in the file
ftell()	Gives the current position in the file
rewind()	Sets the position to the begining of the file

❖ File handling support mainly following functions.

(1) Fopen() :-
- It is used to open any particular file.
  Syntax :- fopen ("filename" , "filemode")
- In first argument , we have to provide file name.
- In second argument , we have to provide file modes like read , write and append.
  Example :- fopen("c:\\hi.txt","r")

(2) Fclose() :-
- It is used to close currently opened file.
  Syntax :- fclose(<file pointer>)
  Example :- fclose(fp)

(3) Fprintf() :-
- It is used to print particular value to the file.
- It have three arguments :

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File pointer
Control
String
variable
Syntax :- fprintf ("filepointer" , "control string",variable)
Example :- fprintf(fp,"%c",a)

(4) Fscanf() :-
- It is used to read value for standard input.
- It have three arguments :
File pointer
Control
String
variable
Syntax :- fscanf ("filepointer" , "control string",variable)
Example :- fscanf(fp,"%c",a)

(5) getw() :-
- It is used to get or read an integer value. [only work with integer data]
Syntax :- getw(<file pointer>)
Example :- getw(fp)

(6) Putw():-
- It is used to write an integer value to the file. [only work with integer data]
Syntax :- putw(<int>,<file pointer>)
Example :- putw(num,fp)

(7) fseek() :-
- It is used to set file position means that it is used to move file position to given location in the file.
Syntax :- fseek(<file pointer> , <off set> , <position>)
Example :- fseek(fp , s,seek_set)

0- SEEK_SET -> beginning of the

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file1- SEET_CUR -> Current
position
2- SEEK_END -> end of the file

(8) Rewind() :-
- It is used to set file position to beginning of the file or starting of the file.
  Syntax :- rewind(<file pointer>)
  Example :- rewind(fp)

(9) Ftell() :-
- It is used to return current file position of given file.
  Syntax :- ftell(<file pointer>)
  Example :- ftell(fp)

(10) Remove() :-
- It is used to remove particular file by providing file name.
  Syntax :- remove(<file name>)
  Example :- remove("myfile.txt")

(11) Feof() :-
- It is used to indicate end of the file.
  Syntax :- feof(<file pointer>)
  Example :- feof(fp)

(12) Rename() :-
- It is used to change from old file name to new file name.

  Syntax :- int rename (char * old file name ,char * new file name)
  Example :- rename("abc.txt" , "jkl.txt")

(13) Ferror() :-
- It is used to check if the file opened successfully or not ,otherwise it returns error.
  Syntax :- ferror(< file pointer>)

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Example :- ferror(fp)

(14) Fflush() :-
- It is used to flush the stream,It is used to clean input buffer aswell as output buffer.
  Syntax :- fflush(< file pointer>)
  Example :- fflush(fp)

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1		Text file & Binary file
2	To write data to the particular file , the filemust be open in_____mode.	Write (w)
3	_____is used to indicate end of the file	feof()
4	_____is used to set the file position to thebeginning of the file.	Rewind()
5	_____ function is used to return currentfile position.	Ftell()
6	_____ is used to return file position togiven location of the file.	Fseek()
7	_____is used to flushes all the filestreams.	Fflush()

Q-11 Explain different I/O operations.

Detail :-

- ❖ I/O stands for input and output.
- ❖ It suppor following functions for input(read) & output(write).

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INPUT	OUTPUT
Fread()	Fwrite()
Fgets()	Fputs()
Fgetc()	Fputc()
Fscanf()	Fprintf()

❖ INPUT FUNCTIONS :-

(1) Fgets() :-
- It is used to get a string.
- It have three arguments

  Address of String
  Maximum length
  File pointer

  Syntax :- fgets(char *s , int n , <file pointer>)

  Example :- fgets(s,80,fp)

(2) Fgetc() :-
- It is used to get a single character from the file.
- It have two arguments

  Character variable
  File pointer

  Syntax :- fgetc(<char variable> , <file pointer>)
  Example :- fgetc(ch , fp)

(3) Fread() :-
- It is same as fscanf() , but fread() also read data from binary file.
- It have four arguments
  Address of variable

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Size of data
Number of values to be readFile pointer
Syntax :- fread(v,s,n,fp)

Reading data from a File

There are three different functions dedicated to reading data from a file

- **fgetc(file_pointer):** It returns the next character from the file pointed to by the file pointer. When the end of the file has been reached, the EOF is sent back.
- **fgets(buffer, n, file_pointer):** It reads n-1 characters from the file and stores the string in a buffer in which the NULL character '\0' is appended as the last character.
- **fscanf(file_pointer, conversion_specifiers, variable_adresses)**: It is used to parse and analyze data. It reads characters from the file and assigns the input to a list of variable pointers variable_adresses using conversion specifiers. Keep in mind that as with scanf, fscanf stops reading a string when space or newline is encountered.

❖ **OUTPUT FUNCTIONS :-**
  (1) **Fputs() :-**
     ▪ It is used to print a string to the file.
     ▪ It have two arguments

        String
        variableFile
        pointer

     Syntax :- fgets(<string variable> , <file pointer>)
     Example :- futs(str,fp)

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(2) Fputc() :-

- It is used to print a single character to the file.
- It have two arguments

Character variable
File pointer

Syntax :- fputc(<character variable> , <file pointer>)

Example :- futc(ch,fp)

(3) Fwrite() :-

- It is same as fprintf() , but the difference is fwrite() can also write binary data.
- It have four arguments
  Address of variable
  Size of data
  Number of values to be read
  File pointer

Syntax :- fwrite(v,s,n,fp)

Writing to a File

In C, when you write to a file, newline characters '\n' must be explicitly added.The stdio library offers the necessary functions to write to a file:

- **fputc(char, file_pointer)**: It writes a character to the file pointed to by file_pointer.
- **fputs(str, file_pointer)**: It writes a string to the file pointed to by file_pointer.
- **fprintf(file_pointer, str, variable_lists)**: It prints a string to the file pointed to by file_pointer. The string can optionally include format specifiers and a list of variables variable_lists.

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1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	_____is used to write character to the file pointed by file pointer	Fputc()
2	_____is used to read whole string from particular file.	Fgets()
3	_____is used to print different values to the file.	Fprintf()
4	_____is used to perform I/O operations for binary file.	Fwrite()

Q-12 Explain Command Line Arguments with suitable example.

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Command line arguments

argument count

array of string arguments

```
#include <stdio.h>

int main(int argc, char *argv[]) {
}
```

argv[0] is the program name with full path
argv[1] is the first argument
argv[2] is the second argument, etc.

Detail :-

- Command line arguments are the argument that are pass when the program isexecute.
- In command line argument , main() also take argument from the user.
- Main() take two arguments
    (i)   Argc – It indicate number of arguments to be passed
    (ii)   Argv[] – It is pointer array which point to each argument that is passedwith the main().

    (iii)   main() takes two arguments:

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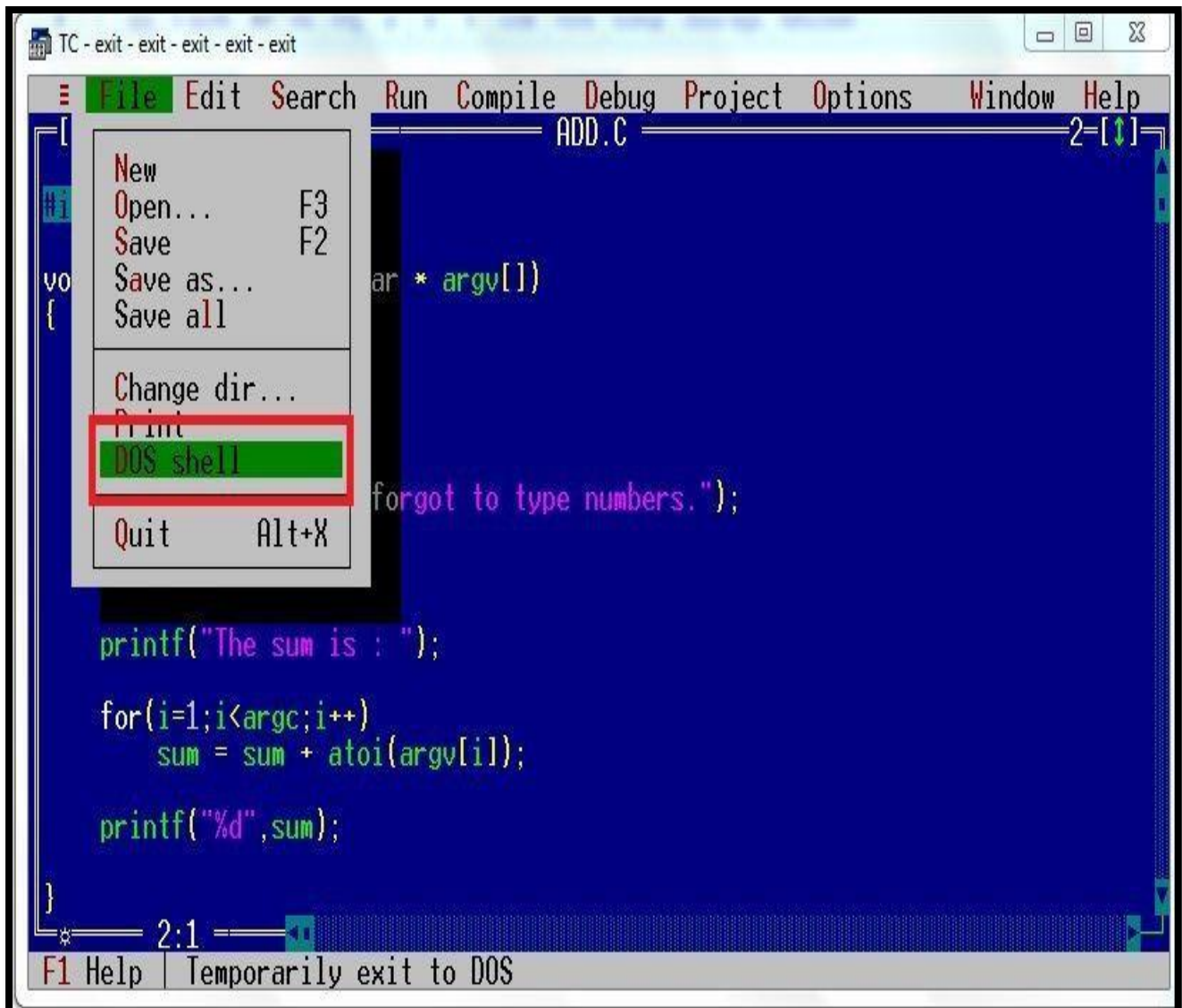
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i. argc ➜ Number of arguments passed

ii. argv[] ➜ pointer array which points to each argument whichis passed to main().

Note:- argv[0] ➜ name of the program that is exevuted.

    argv[1] ➜ First argument

    argv[2]   Second argument

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1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	In Command Line Arguments main () takes _____ arguments.	2(Two)
2	argc stands for _____	Argument count
3	_____is pointer array which points toeach argument which is passed to main().	Argv[]
4	_____holds name of the program	Argv[0]
5	**To execute command line program , go to filemenu and select _____**	**Dos Shell**

Q-13 Give difference between Text file and Binary file.

Detail :-

Text File	Binary File
1) Text file is the file created by user.	1) Binary file is the file created by the computer.
2) The extension of text file may be .txt, .c etc.	2) The extension of binary file may be .exe, .obj etc.
3) In text file, there is special character ('\0') which indicates end of file.	3) In binary file there is no such special character that indicates end of file.
4) In text file, data is stored in text format, so if we have integer value 1234 then it will require 5 bytes (1234\0)	4) In binary file, data is stored in the format of main memory. So if we have integer value 1234 then it will require only 2 bytes.

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SUMMARY QUESTIONS OF CHAPTER -5

ONE - MARK QUESTIONS

- ✓ Which Keyword is used to declare Structure?
- ✓ What is Union?
- ✓ Write down Syntax for declaring Structure.
- ✓ How to declare union ?
- ✓ What is Data File?

TWO - MARK QUESTIONS

- ✓ Explain Pointer to Structure with Example.
- ✓ Explain Pointer within Structure by Example.
- ✓ Write note on Nested Structure.
- ✓ Give difference between Structure and Union.
- ✓ Explain different file modes.
- ✓

THREE - MARK QUESTIONS

- ✓ Explain Command Line Argument with Example.
- ✓ Explain Fopen() , Fclose() and Fseek() with Example.
- ✓ Explain any three I/O operations functions with Example.
- ✓ Explain Union with Example.

FIVE - MARK QUESTIONS

- ✓ Explain File Handling in Detail.
- ✓ Explain Structure with Example.
- ✓ Write note on UDF with Structure by Example.
- ✓ List out different File Handling Functions and explain any five with Example.