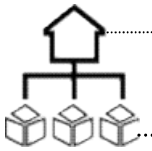


C PROGRAMMING

Important Topics for C programming M.C.Q: Data type, variable, iteration, size of data type, logic, control statement, break, continue, output, string output and previous questions.

Who is known as the first computer programmer? *[Com. (AP)-2020]*

a) Alan Turing
b) Ada Lovelace
c) Charles Baddage
d) None of this

Ans.: b

Explanation: **Ada Lovelace** has been called the world's first computer programmer. What she did was write the world's first machine algorithm for an early computing machine that existed only on paper. Of course, someone had to be the first, but Lovelace was a woman, and this was in the 1840s.

Who developed the C programming language?

a) Bjarne Stroustrup b) James Gosling c) Dennis Ritchie d) Ray Boyce **Ans.:**c

Explanation: Dennis Ritchie developed the C programming language at Bell laboratories during 1970s. The C programming language came out of Bell Labs in the early 1970s. The C programming language was devised in the early 1970s as a system implementation language for the nascent UNIX operating system.

CHARECTERESTICS OF A C PROGRAM

- ✓ Middle level language.
- ✓ Small size – has only 32 keywords
- ✓ Extensive use of function calls- enables the end user to add their own functions to the C library.
- ✓ Supports loose typing – a character can be treated as an integer and vice versa.
- ✓ Structured language
- ✓ Low level (Bit Wise) programming readily available
- ✓ Pointer implementation extensive use of pointers for memory, array, structures and functions.
- ✓ It has high-level constructs.
- ✓ It can handle low-level activities.
- ✓ It produces efficient programs.
- ✓ It can be compiled on a variety of computers.

==. Procedural programming method is followed in

a) C b) COBOL c) Cobra d) All of the above Ans.: d

Explanation: **Procedural programming** is a programming paradigm, derived from structured programming based on the concept of the procedure call. Procedures, also known as routines, subroutines, or functions, simply contain a series of computational steps to be carried out. Any given procedure might be called at any point during a program's execution, including by other procedures or itself. The first major procedural programming languages appeared circa 1957–1964, including Fortran, ALGOL, COBOL, PL/I and BASIC. Pascal and C were published circa 1970–1972.

Difference between High, Mid and low level language

High level	Mid level	Low Level
High level languages provide almost everything that the programmer might need to do as already built into the language	Middle level languages don't provide all the built-in functions found in high level languages, but provides all building blocks that we need to produce the result we want	Low level languages provides nothing other than access to the machines basic instruction set.
Example: java, Python	C,C+	Assembler

Which of the following languages does not need any translation? *[Com (o-IT)-2020]*

a) Machine language
b) 4GL
c) 3GL
d) Assembly language

Ans.: a

Which type of following errors is generated when the program is being executed? *[Com (o-IT)-2020]*

a) Syntax error
b) Semantic error
c) Run-time error
d) Linker error

Ans.: c

Explanation: Syntax error generated in compiles time.

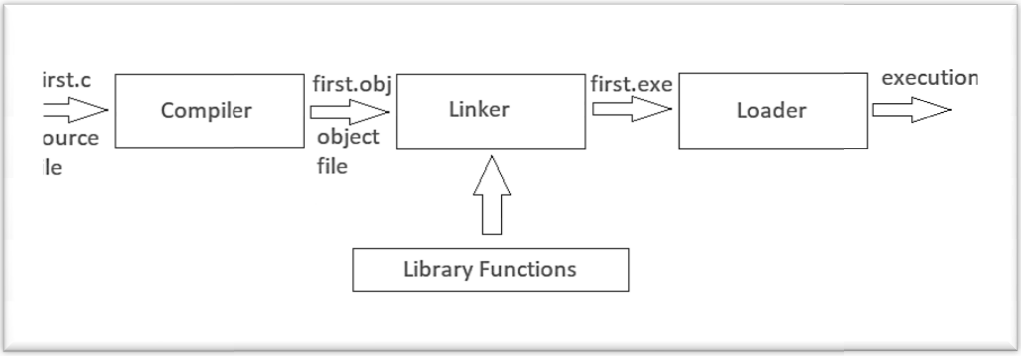
==. Identify the correct sequence of steps to run a program

a) link, load, code, compile and execute b) code, compile, link, execute and load
c) Code, compile, link, load and execute d) compile, code, link, load and execute Ans.: c

Explanation:

- ✓ **Source File**: This file contains the source code of the program. The file extension of any c file is .c. Like first.c
- ✓ **Header file:**A header file is a file with extension .h which contains the C function declarations and macro definitions and to be shared between several source files.

- ✓ **Object file:**An object file is a file containing object code, with an extension .o, meaning relocatable format machine code that is usually not directly executable.
- ✓ **Executable file:**The binary executable file is generated by the linker. The linker links the various object files to produce a binary file that can be directly executed.



==. Physically placing the machine instructions and data into main memory is done by

a) Linker b) Loader c) Code Generator d) Interpreter Ans.: b

Which of the following is not a standard compiler of C programming language? *[Com. (AP)-2020]*

a) Microsoft Visual C/C++ Compiler
b) GNU GCC Compiler
c) Codeblocks C Compiler
d) Borland C Compiler

Ans.: c

Which one is not a header file? *[BREB -AJE-2019]*

a) Conio.h b) iostream.h c)math.h d)instead.h **Ans.:d**

Explanation:

- ✓ **#include** is a pre-processor directive. It is not really part of our program, but instead it is an instruction to the compiler to make it do something. It tells the C compiler to include the contents of a file
- ✓ Header file is a file that contains function declaration and macro definition for C in-built library functions.
- ✓ All C standard library functions are declared in many header files which are saved as file_name.h.
- ✓ We are including these header files in our C program using "#include <file_name.h>" command to make use of the functions those are declared in the header files.
- ✓ **Example:**stdio.h,conio.h,math.h, assert.h, ctype.hetc.

main:

- ✓ In this particular example, the only function in the program is called main.
- ✓ A C program is typically made up of large number of functions. Each of these is given a name by the programmer and they refer to each other as the program runs.

- ✓ C regards the name main as a special case and will run this function first i.e. the program execution starts from main.

==. **What is the output of following program:** *[ICML (AP)-2019]*

```
int main ()
{
printf ("%d\t", sizeof (6.5));
printf ("%d\t", sizeof (90000));
printf ("%d\t", sizeof ("A"));
printf ("%d\t", sizeof('x'));
return 0;
}
```

Ans.: 8 4 2 4

Solution:

Here **`printf ("%d\t", sizeof (6.5));`** is a double value. So, size of double value is 8 bytes. Next line print sizeof integer which size is 4 byte and the third line character constant is 2 bytes (size of char data type is one byte). The fourth line is treated as integer which size is 4 bytes.

Type	Storage size	Value range
char	1 byte	-128 to 127 or 0 to 255
unsigned char	1 byte	0 to 255
signed char	1 byte	-128 to 127
int	2 or 4 bytes	-32,768 to 32,767 or -2,147,483,648 to 2,147,483,647
unsigned int	2 or 4 bytes	0 to 65,535 or 0 to 4,294,967,295
short	2 bytes	-32,768 to 32,767
unsigned short	2 bytes	0 to 65,535
long	8 bytes	-9223372036854775808 to 9223372036854775807
unsigned long	8 bytes	0 to 18446744073709551615

What is the maximum value that can be stored in a 32-bit signed integer of C language? *[Com. (AP)-2020]*

a) 10^32 b) 2^32 c) 2^32 d) 2^31 - 1

Ans.: d

What is the output of the following program?

```
#include<stdio.h>
  int main()
```

```
{
  printf("%d
%d%d",sizeof(3.14f),sizeof(3.14),sizeof(3.1414));
  return 0;
}
```

Ans.: 4 8 8 (sizeof(3.14f) is consider as float then next two are consider as double)

Explanation:

- ✓ Every program starts from main() function.
- ✓ printf() is a library function to display output which only works if #includeis included at the beginning.
- ✓ Here, stdio.h is a header file (standard input output header file) and #include is command to paste the code from the header file when necessary. When compiler encounters printf()function and doesn't find stdio.h header file, compiler shows error.
- ✓ return 0; indicates the successful execution of the program.

==. What is the size of an int data type?

a)4 Bytes b) 8 Bytes
c) Depends on the system/compiler d) Cannot be determined **Ans.:** c

Explanation: The size of the data types depends on the system.

==. Which data type is most suitable for storing a number 65000 in a 32-bit system?

a) signed short b) unsigned short c) long d) int Ans.:b

Explanation: 65000 comes in the range of short (16-bit) which occupies the least memory. Signed short ranges from -32768 to 32767 and hence we should use unsigned short.

==. Maximum value of an unsigned integer is—

a) 65535 b) 32767 c) -32767 d) -65535 **Ans.:** a

==. The keyword typedef is used to

a) create a type of function b) define the type of function
c) define the type of a variable d) create a new datatype name **Ans.:** d

Explanation: The existing name in C program can be changed by using typedef keyword. The C programming language provides a keyword called **typedef**, which you can use to give a type a new name. Following is an example to define a term **BYTE** for one-byte numbers − **typedef unsigned char BYTE;**

==. By default a real number is treated as a

a) float b) double c) long double d) integer **Ans.:** d

==. Which Format Specifier is used for typing double data? *[BREB 2019]*

a) %f b)%1f c)%d d)%s **Ans.:** b

Explanation:

%c	Character	char unsigned char

%d	Signed Integer	short unsigned short int long
%e or %E	Scientific notation of float values	float double
%f	Floating point	float
%lf	Floating point	double
%s	String	String
%p	Address of pointer to void void *	void *
%u	Unsigned Integer	unsigned int unsigned long

==. **Which one is the not basic data type of c programming?** *[SBL (AP)-2016]*

a) Char b) int c) void d) None of this **Ans.:** c

==. **Suppose a C program has floating constant 1.414, what's the best way to convert it as afloat data type?** *[Combined (Officer- IT/ICT)-2019]*

a) (float)1.414 b) float(1.414) c) 1.414f or 1.414F d) None of these Ans. c

Explanation: By default, floating constant is of double data type. By suffixing it with f or F,can be converted to float data type.

```
main()
{
        int n;
        printf("d", scanf ("%d", & n));
}
```

==. **For the above program if input is given as 20. Whatwill be the output?**

a) 20 b) 1 c) 2 d) 0 **Ans.:** b

==. **What is the value of the arithmetic expression (written in C)**

2*3/4-3/4*2

a) 0 b) 1 c) 1.5 d)None of these

Ans.: 2*3/4-3/4*2= 6/4-3/8=1-0=1

C trate all expression values as integer.

==. **An external variable is one**

a) Which resides in the memory till the end of the program?

b) Which is globally accessible by all functions?

c) Which is declared outside the body of any function?

d) All of the above Ans.: d

Explanation: An external variable is the one which is created outside the body of the function, i.e. within the source code file.The scope of the external variable is till the end of the program.

==. **What is the output of the following program?** *[SBL (AP)-2016]*

```
int main ()
{
printf("%.3f", 8/((3*8)*3));
  return 0;
}
```

a) 0.000 b) 1.000 c) 0.111 d) None **Ans.:** a

Explanation: The call of `printf` has undefined behavior because the conversion specifier `%f` does not correspond to the type of the expression of int.

==. **Which is/are the integer constant/constants?**

a) Decimal integer constant b) Octal integer constant
c) Hexadecimal integer constant d) All of the above **Ans.:**d

What will happen if this C program is compiled and executed? *[Com. (AP)-2020]*

```
int main()
  {
return 0;
  }
```

a) The program will show some garbage output
b) There will be a compile error and the program will not execute
c) No output(Output screen will be empty)
d) There will be a run-time error

Ans.:c

==. **What will be the output of the following code segment?**

```
int x=24, y=39, z=45
z=x+y;
y=z-y;
x=z-y;
printf("\n%d%d%d",x,y,z);
```

a) 24 39 63 b) 39 24 63 c) 24 39 45 d) 39 24 45 Ans.:b

==. **Consider the following variable declarations and definitions in C.** *[Combined (Ofc- IT/ICT)-2019]*

i. int var_9=1
ii. int 9_var=2
iii. int _=3

==. **Choose the correct statement above variables.**

a) Both i) and ii) are valid b) Only i) is valid
c. Both i) and iii) are valid d) All of these Ans.: c

Explanation:

- ✓ Every variable name should start with alphabets or underscore (_).
- ✓ No **spaces** are allowed in variable declaration.
- ✓ Except underscore (_) no other special symbol are allowed in the middle of the variable declaration (not allowed -> roll-no, allowed ->roll_no).
- ✓ Maximum length of variable is **8 characters** depend on compiler and operation system.
- ✓ Every variable name always should exist in the left-hand side of assignment operator (invalid -> 10=a; valid -> a=10;).
- ✓ No keyword should access variable name (**int for** invalid because **for** is a keyword).

Some Example of valid and invalid identifier

Valid identifiers	Invalididentifiers
RollNo	2name
Roll_No	Roll No
_Roll_No	int void
rollno	
Year	

==. **Which of the declaration is correct?** *[ICB(AP)-2017] [Combined (Officer- IT/ICT)-2019]*

a) int length b)char int c) int long d) float double **Ans.: a**

==. **Which of the following is not a valid variable name declaration?**

a) int _a3 b) int a_3 c) int 3_a d) int _3a **Ans.:**c

Explanation: Variable name cannot start with a digit. Must start with an underscore or alphabets.

==. **A name having a few letters, numbers and special character _(underscore) is called**

a) keywords b) reserved keywords

c) tokens d) identifiers **Ans.:** d

Explanation: An identifier is a name used to identify a variable, function, array, structure, array, union etc. It can be consists ofmaximum 31 characters.

==. **Which of the following cannot be used as identifiers?**

a) Letters b) Digits c) Underscores d) Spaces **Ans.:** d

Explanation: Variable name, function name, structure name etc. are called identifiers. Spaces are not used in names.

==. **Which one is the invalid variable name in c programming?** *[ANE -BPSC -2019]*

a) Average b) No#ofStrdent c) Xzy d) y23Z **Ans.:** b

==. **Which of the following is true for variable names in C?**

a)They can contain alphanumeric characters as well as special characters

b) It is not an error to declare a variable to be one of the keywords(like goto, static)

c) Variable names cannot start with a digit

d) Variable can be of any length **Ans.:** c

Explanation: According to the syntax for C variable name, it cannot start with a digit.

- ✓ Multiple DeclarationsThe comma can be used as a separator (*not* acting like the comma operator) in order to delimit multipledeclarations within a single statement. The following statement contains five declarations:intfn(void),*ptr,(*fp)(int), arr[10][20], num;
- ✓ The declared objects in the above example are:
- ✓ fn: a function taking void and returning int;
- ✓ ptr: a pointer to an int;
- ✓ fp: a pointer to a function taking int and returning int;
- ✓ arr: an array of size 10 of an array of size 20 of int;
- ✓ num: int.Alternative Interpretation

==. Which of the following doesn't require an & for the input in scanf()?

a) char name[10]; b) int name[10];
c) float name[10]; d) double name[10]; **Ans.:**a

Explanation: gets() function for input.

Note: scanf("%s",str); does not read string type which contain white space. Hence to read multi word string use gets(str).

==. Which of following comment regarding the reading of a string using scanf() and gets () is true?

a) scanf is delimited by blank, gets is delimited by end of line
b) scanf is delimited by end of line, gets is delimited byblank space
c) Both can be used interchangeably
d) None of these **Ans.:** a

==. int C=10; printf("%d",c--); given output off----*[Combined(AP)-2019]*

a) 10 b)11 c) 9 d)8 **Ans.: a**

Explanation:

Operator	Operator/Description
Pre increment operator (++i)	value of i is incremented before assigning it to the variable i
Post increment operator (i++)	value of i is incremented after assigning it to the variable i
Pre decrement operator (-- i)	value of i is decremented before assigning it to the variable i
Post decrement operator (i--)	value of i is decremented after assigning it to variable i

==. Which of the following will not increase the value of variable c by 1?*[BREB(IT)-2016]*

a) C++ b) C = C+1 c) C+1 >= C d) C+= 1 **Ans.:**c

==. What is the output of following program?

```
int main ()
{
int c=10;
printf("%d\t",c); // print 10
printf("%d\t",c++);// increment but not execute this line so print 10
printf("%d\t",++c);// ++ imediate increment also executeprevious step soprint 12
printf("%d\t",c--);// decrement but execute in next line so print 12
```

```
printf("%d\t",--c);// imediate decrement with previous line so print 10
return 0;
}
```

Ans.: 10 10 12 12 10

==. What is the output of the following program? *[JBL(SO-IT/ICT)-2016]*

```
int main ()
{
  int i = 0;
  int x = i++, y = ++i;
printf ("%d %d", x, y);
  return 0;
}
```

a) 0,2 b) 0,1 c) 1,2 d) undefined **Ans.:** a

Explanation: Assume that i,j and k are integer variables and their values are 8, 5 and 0 respectively. What will be the values ofvariablesi and k after executing the following expression?

See the following code segment.

```
k=(j>5)?(i<5)?i-j:j-i:k-j;
i-=(k)?(i)?(j)?:(i):(k);
```

==. What will be the result of execution?

a) -3 and 3 b) 3 and -5 c) 3 and -3 d) -5 and 3 Ans.: d

Explanation: Given that the values of i,j and k are 8, 5 and 0 respectively. The first statement j>5 is not executed because j=5and i<5 is also not executed. So the program evaluate k-j, which is, 0-5=-5. So afetre execution of first expressionthe values are 8, 5 and -5 respectively.In the second statement the values of k, i are non zero. so it is true for both. So the values of i, j and k are 3, 5and -5

==. The value 9.87 to 10 when use? *[BB(AP)-2016]*

a) floor () b) ceil() c) both d) None **Ans.:** b

Explanation:

- ✓ **Ceil :**the ceil function is the function that takes as input a real numberxand gives as output the greatest integergreater than or equal to x. Like ceil(3.7)=4 , ceil(4.2)=5.
- ✓ **Floor:**thefloor function is the function that takes as input a real numberxand gives as output the greatest integer less than or equal to x. Like floor(3.7)=3 , floor(4.2)=2.

==. What's wrong with the statement? (x =4 && y = 5) ? (a=5); (b=6); *[BB AP-2012]*

a) The question mark should be an equal sign
b) There are too many variables in the statement
c) The conditional operator is only used with a string
d) The first semicolon should be a colon Ans.: d

==. Which is logical operator?

a) + b)> c) && d)<< Ans.:c

==. Which is logical operator? *[JBL (AME)-2011]*

a) + b)>= c) AND d)<< Ans.: b

==. Which of the following is not logical operator?

a) & b) && c) || d) ! Ans.: a

==. If 'a' is an integer variable, then a=5/2 will return a value

a) 2.5 b) 2 c) 2.000000 d) 2.500000 Ans.:b

a=5/2=2.5Though 'a' is an integer variable so the outcome will be 2

==. printf("%d", 9%5); prints?

a) 1.8 b) 1.0 c)4 d) 2 Ans.: c

==. When applied to a variable, what does the unary "&" operator yield?

a) The variable's address b) The variables right value

c) The variable's binary form d) The variable's value Ans.: a

Explanation: The address of a variable is yield by the unary operator Address of. This unary operator "&" operates on only oneoperand.

==. What is the output of the following program?

```
int main()
{
    int f=11,i=3;
    i+=(f>3)? i&2:5;
    printf("%d ",i);
    return 0;
}
```

Ans.: 5

Explanation:

i+=(f>3)? i&2:5

i+= (11>3)? 3&2 :5 [so statement(f>3) is true andi&2 executed]

i+=3&2 [0011 & 0010 =0010 =2]

i+=2

5

CONDITIONAL OR TERNARY OPERATORS IN C:

Syntax: (Condition? true_value: false_value);

Example: (A >100? 0 : 1);

```
int x=1, y ;
y = (x ==1 ?2 : 0 ) ;
```

output: 2

Example:

```
int a=100,b=200,c=300,c;
```

```
x= (a>b)?((a>c)?a:c):((b>c)?b:c);
```

1st part 2nd part 3rd part

Explanation:

Here a> b is false so 3rd part is working

In 3rd part, b>c also false.soC is working

Output: x=300

```
int main ()
{
  unsigned int a = 29;          /* 29 = 0001 1101 */
  unsigned int b = 48;          /* 48 = 0011 0000 */
  int c = 0;
  c = a & b;                    /* 0001 1101 & 0011 0000=10000=16 */
printf ("%d & %d = %d\n", a, b, c);
  c = a | b;                    /* 61 = 0011 1101 */
printf ("%d | %d = %d\n", a, b, c);
  c = a ^ b;                    /* Xor operation: 45 = 0010 1101 */
printf ("%d ^ %d = %d\n", a, b, c);
  c = ~a;                       /* -30 = 1110 0010 */
printf ("~%d = %d\n", a, c);
  c = a << 2;          /* left shift: 0001 1101<<2= 01110100= 116 */
printf ("%d << 2 = %d\n", a, c);
  c = a >> 2;          /* Right Shift:0001 1101>>2= 0000111= 7 */
printf ("%d >> 2 = %d\n", a, c);
  return 0;
}
```

==. **What is the final values of a and c in the following C statement?** *[CombinedAME-2019]*
(initialize value a=2,c=1) c=c? a=0:2;

a) a=0,c=0 b) a=2,c=2 c) a=2,c=2 d) a=1,c=2 **Ans. a**

Explanation:

Steps: 2? condition is true

a=0;

c=a;

c=0;

==. **Which of the following statement is used to exit loop immediately** *[ANE -BPSC -2019]*

a) break b) if c) switch d) continue **Ans.:** a

==. **The CONTINUE statemment cannot be used with**

a) for b) switch c) do d) while **Ans.:**b

Explanation: The CONTINUE Keyword skips the code and immediately passes control to the beginning of the statement fornext iteration

==. **The keyword 'break' cannot be simply used within _____**

a) do-while b) if-else c) for d) whileAns: b

Explanation: "break" and "continue" can be used in "for", "while" and "do-while" loop body. But only "break" can be used in "switch" body.

==. Unconditional Jump Statements

- ✓ C language permits to jump from one statement to
- ✓ C supports break, continue, return and goto jump
- ✓ **Break statement** Breaks the execution sequence. That iswhen the break statement executes in a block (loop) it'llcome out from block (loop).
  Syntax:break;
- ✓ **Continue statement** Used to skip a part of the loop undercertain conditions.
  Syntax: continue;
- ✓ **Return statement** Terminates the execution of a functionand returns the control to the calling function.
  Syntax:return [exp/value];
- ✓ **Goto statement** Jumps from one point to another with in afunction.
  Syntax:Labell:goto label2:

==. Which one is the following can be replace instead of 'if' *[ANE -BPSC -2019]*

a)Return b) structure c) for d) switch

Explanation:

Control statement:

- ✓ if-else
- ✓ switch – case: Work only for integer and char value
- ✓ for
- ✓ while(): Infinite loop when while(1)
  while is called entry control loop
- ✓ do while() : work 1 st time without checking condition.

==. What is an example of iteration in C? *[PKB(AP)-2018]*

a) for b) while c) do-while d) all of the above **Ans.:** d

Explanation: **The for allows us to specify three things about a loop in a single line:**

(a) Setting a loop counter to an initial value.
(b) Testing the loop counter to determine whether its value has reached the number ofrepetitions desired.
(c) Updating the value of loop counters either increment or decrement.

==. Which control statement can be executed at least once? *[ICB(AP)-2018]*

a) while b) for c) dowhile d) all of the above **Ans.:** c

Explanation: In **whileloop**the given condition is checked at the start of the loop.If the condition is false then the loop is not executed at all.Only when the condition is true the loop block is executed.

In **do while loop** first the loop block is executed then condition is checked at the end of 1st time execution. Ex.

```
int main()
{
  int i = 2;
  do
    {
printf ("Test %d", i);
    }
  while (i>3);// condition false but print 2 for the first time
  return 0;
}
```

Ans.: Test 2

==. **How many times will the following code be executed?**

x=10;
while(x=1)
x++;

a) Never b) Once
c) 15 times d) Infinite number of times **Ans.:** d

==. **Which of the following cannot be checked in a switch-case statement?**

a) character b)integer c) float d) none of the above **Ans.:** c

==. **Which datatype can accept the switch statement?**

a) int b) char c) long d) all the mentioned **Ans.:** d

==. **The C code 'for(;;)' represents an infinite loop. It can be terminated by _____**

a) break b) exit(0) c) abort() d) terminate **Ans.:** a

==. **How long the following loop runs?**

for(x=0;x=3;x++)

a) Three times b) Four times c) Forever d) Never **Ans.:**d

Explanation: The first statement of a for loop is initialize the loop counter, second is conditional statment and the third one isincrement/decrement of the loop counter.In the given expression the second statement is an assignment statement instead of condition.So the for loop never execute

int warr[3][2][2]={1,2,3,4,5,6,7,8,9,10,11,12};

==. **What will be the value of warr[2][1][0]?**

a) 5 b) 7 c) 7 d) 11 Ans.:d

==. **What is the effect of the following code?**

```
main(){
int a[4]={1,5};
printf("%d",a[3]);
}
```

a) 0 b) Syntax error because of improperinitialization
c) 5 d) Syntax error because of invalidindex **Ans.:**a
Given that int a[4]={1,5}
So a[2], a[3] etc. are 0 or gargbag.

Given the piece of code
int a[50];
int *pa;
pa=a;

==. **To access the 6th element of the array which of the following is incorrect?**
a) *(a+5) b) a[5] c) pa[5] d) *(*pa+5) **Ans.:**d

==. **What will be the output of the following code segment?**
int a[10]={1,2,3,4,5,6,7,8,9,10};
*p=a;
printf("\n%d:%d", p[7], p[a[7]]);
a) 7:7 b) 7:8 c) 8:9 d) 8:8 **Ans.:**c

Explanation: The first element of the array i.e. a[0] is assigned by *p=a. Therefore a[0]=1. Then p[7]=8 and p[a[7]]=p[8]=9Hence 8:9

==. **int number[]={10,20,30,40,50}; number[3]=?** *[SBL/JBL.(SO-IT/ICT)-2018]*
a) 10 b) 20 c) 30 d) 40 **Ans.:**d

Explanation: array starts at position 0.

==. **Which of the following function declaration need not have a return statement in it's body?**
a) int a(char *s) b) void b(int a[], int n)
c) float *c() d) short d(long x) **Ans.:**b
No value returned by void.

==. **An array contains the following letters, Color = {E,L,E,C,T,I,O,N) The value of the variable, E=3. Color [E] points to which value?**
a) E b) C c) T d) 1 **Ans.:** b

==. **For the following definition, which of the given option is correct?**
int a[10];
a) a++ b) a=a+1 c) *a++ d) *a[1] Ans.:c
*a+0 points to the a[0] location.

FUNCTIONS

A function is a block of code that performs a specific task. It has a name and is reusable, i.e., it can be executed from as many different parts in a program as required.

- ✓ Every C program can be thought of collection of functions.
- ✓ main() is also a function.

Types of Functions

Library functions:

These are the in-built functions of C library. These are already defined in header files.

Example printf(); is a function which is used to print at output.It is defined in 'stdio.h'file.

User-defined functions:

Programmers can create their own function in 'C' to perform specific tasks.

Example # include <stdio.h>

```
main()
{
message ( ) ;
}
message ( )
{
printf("Hello");
}
```

- ✓ A function receives zero or more parameters, performs a specific task, and returns zero or one value.
- ✓ A function is invoked by its name and parameters.
- ✓ No two functions have the same name in a single C program.
- ✓ The communication between the function and invoker is through the parameter and the return value.
- ✓ A function is independent.
- ✓ It is "completely" self-contained.
- ✓ It can be called at any place of your code and can be ported to another program.
- ✓ Functions make programs reusable and readable.

Note: Function calls execute with the help of execution **stack**. Execution of C program starts with main() function. main() is a user defined function.

Use of functions

a) Helps to avoid repeating a set of statements many times.
b) Helps to avoid repeated programming across programs.
c) Makes the debugging task easier.
d) All of the above **Ans.:**d

==. **Which of the following is a correct format for declaration of function?**

a) return-type function-name(argument type);
b) return-type function-name(argument type){}
c) return-type (argument type)function-name;
d) all of the mentioned **Ans.:** a

==. **Which of the following function declaration is illegal?**

a) int 1bhk(int) b) int 1bhk(int a)

c) int 2bhk(int*, int []) d) all of the mentioned **Ans.:** d

==. **The value obtained in the function is given back to main by using _____ keyword.**

a) return b) static c) new d) volatile **Ans.:** a

==. **The default parameter passing mechanism is**

a) call by value b) call by reference

c) call by value result d) None of these. **Ans.:** Option A

Explanation: Call –by-value passes theactual value of parameters. Call-by-reference passes the address of actual parameters.

==. **What is the following function determining?**

```
int fn(int a, int b)
{
if (b==0)
return 0;
if (b==1)
return a;
return a+fn(a, b-1);
}
```

a)a+b where a and b are integers b)a+b where a and b are non-negative integers

c) a*b where a and b are integers d) a*b where a and b are non-negative integers

Ans.:b

Explanation: The above function is a recursive function. The function will return a+b where a and b are non-negative integers

RECURSION

In general, programmers use two approaches to write repetitive algorithm. One approach using loops, the other is recurtion. Recursive functions typically implement recurrence relations,which are mathematical formula in which thedesired expression (function) involving a positive integer, nis described in terms of the flunction applied to corespondingvalues for integers less than 'n'

- ✓ The finction written in terms of itself is a recursive case.
- ✓ The recursive case must call the function with adecreasing 'n'.
- ✓ Recursion in computer programming is exemplifiedwhen a function defined in terms of itself.
- ✓ Recursion is a repetitive process in which a functioncalls itself.

Note: Recursive function must have an if condition to forcethe function to return without recursive call being executed.If there is no such condition, then the function executionfalls into infinite loop.

Rules for designing recursive function

- ✓ Determine base case
- ✓ Determine general case
- ✓ Combine, base and general case into a function

Example 5: Recursive factorial function

```
1.  int factorial (int n)
2.  {
3.  if(n==0)
4.  return 1;
5.  else
6.  return (n*factorial(n-1));
7.  }
```

The statement 3 is a base condition, which stops the recursive call of function.
The statement 6 reduces the size of problem by recursively calling the factorial with (n-1).

Disadvantages:

- ✓ Recursive programs increase the execution time ofprogram.
- ✓ Recursive programs typically use a large amount ofcomputer memory and the greater the recursion, themore memory is used.
- ✓ Recursive programs can be confusing to develop andextremely complicated to debug.

==. **Recursion is a method in which the solution of a problem depends on _____**

a) Larger instances of different problems b) Larger instances of the same problem
c) Smaller instances of the same problem d) Smaller instances of different problems **Ans.:** c

Explanation: In recursion, the solution of a problem depends on the solution of smaller instances of the same problem.

==. **Which of the following problems can't be solved using recursion?**

a) Factorial of a number b) Nth fibonacci number
c) Length of a string d) Problems without base case **Ans.:** d

Explanation: Problems without base case leads to infinite recursion call. In general, we will assume a base case to avoid infinite recursion call. Problems like finding Factorial of a number, Nth Fibonacci number and Length of a string can be solved using recursion.

==. **Recursion is similar to which of the following?**

a) Switch Case b) Loop c) If-else d) if elif else **Ans.:** b

Explanation: Recursion is similar to a loop.

==. **In the absence of a exit condition in a recursive function, the following error is given**

a) Compile time error b) Run time error
c) Logical error d) No error **Ans.:** b

Explanation: When a recursive function is called in the absence of an exit condition, it results in an infinite loop due to which the stack keeps getting filled(stack overflow). This results in a run time error.

==. Which of the following statements is true?

a) Recursion is always better than iteration
b) Recursion uses more memory compared to iteration
c) Recursion uses less memory compared to iteration
d) Iteration is always better and simpler than recursion **Ans.:** b

Explanation: Recursion uses more memory compared to iteration because every time the recursive function is called, the function call is stored in stack.

Consider the following declaration in C:
char a[ ];
char *p;

==. Which of the following statements is not a valid statement?

a) p = a b) p= a+ 2 c) a = p d) p= &a[2] **Ans.: c**

P = a,
P = a + 2;
P = &a[2];
These are initializing pointer P, which are valid statements.
a = P; is changing base address of array which is invalid.

==. What is the output for the following program? *[Competition commission written -2019]*

```
int main(void){
  char name[] = "Harry Potter";
printf("%s", name);   // Output: Harry Potter
printf("%s", name+1); // Output: arry Potter
printf("%c", *name); // Output: H
printf("%c", *(name+7));   // Output: o
  char *namePtr;
namePtr = name;
printf("%c", *namePtr);     // Output: H
printf("%c", *(namePtr+1));   // Output: a
printf("%c", *(namePtr+7));   // Output: o
}
```

==. What is the output for the following program?

```
int main()
{
  char *str = "abcde";
  printf ("%c", *str);
  printf ("%c", *str++);
  printf ("%c", *(str++));
  printf ("%s", str);
```

```
  return 0;
}
```

Ans.:aabcde

Remember	
printf	= print formatted string
scanf	= reads formatted string
getchar	= reads character
putchar	= display a character
gets	= reads a string
puts	= display a string

Which of following comment regarding thereading of a string using scanf() and gets () is true?

a) Both can be used interchangeably
b) scanf is delimited by end of line, gets is delimited byblank space
c) scanf is delimited by blank, gets is delimited by end ofline
d) None of these **Ans:**c

==. What is the output of the following program?

```
int main()
{
  char str[]="Heal";
printf("%c",str[4]);
  return 0;
}
```

a) H b) l c) d d) None **Ans.:** d

==. Which function will you choose to join two words?

a) strcpy() b) strcat() c) strncon() d) memcon() **Ans.:**b

Explanation: The strcat() function is used for concatenating two strings, appends a copy of the string.

char *strcat(char *s1,const char *s2);

List of String function:

- ✓ **strcat**- concatenate two strings
- ✓ **strchr**- string scanning operation
- ✓ **strcmp** - compare two strings
- ✓ **strcpy** - copy a string
- ✓ **strlen**- get string length
- ✓ **strncat** - concatenate one string with part of another
- ✓ **strncmp** - compare parts of two strings

- ✓ **strncpy** - copy part of a string
- ✓ **strrchr** - string scanning operation

==. Which of the following function returns a pointer to the located string or a null pointer if string is not found.

a) strtok() b) strstr() c) strspn() d) strrchr() **Ans.:** b

Explanation: The strstr() function is used to return a pointer to the located string, or if string is not found a null pointer is returned.

==. The_____ function returns the number of characters that are present before the terminating null character.

a) strlength() b) strlen() c) strlent() d) strchr() **Ans.:**b

Explanation :The strlen() function is used to return the number of characters that are present before the terminating null character.size-t strlen(const char *s);The length of the string pointed to by s is computed by strlen().

==. To store address in c programming which one is used? *[ANE -BPSC -2019]*

a) Break b) pointer c) char d) float **Ans.:** b

==. Which of the following is not possible in C?

a) Array of function pointer b) Returning a function pointer
c) Comparison of function pointer d) None of the mentioned **Ans.:** d

==. What is the output of the following program: *[Competition Commision(P)-2019]*

```
int main()
{
char *a[2] = { "hello", "hi" };
printf ("%s", *(a + 1));
return 0;
}
```

Output: hi

==. Which of the following is a valid string constant?

a) "programming" b) "programming c) 'programming d) $programming$ **Ans.:**a

Explanation: With every use of memory allocation function, what function should be used to release allocated memory which isno longer needed?

a)dropmem() b)dealloc() c) release() d)free() Ans.:d

Explanation: The library function free() is used to deallocate the memory that is no longer be used. This deallocated memory isdynamically allocated by malloc, calloc and realloc previously.

==. Which header file should be included to use function like malloc() and calloc()?

a)memory.h b)stdlib.h c)string.h d)dos.h **Ans.:**b

Explanation: The stdlib.h header file contains malloc(), calloc() and realloc() dynamically allocated array functions.

==. Size of the following union (assume size of int=2, size of float=4 and size of char=1);

```
union ABC
{
int a;
float b;
char c;
};
```

a) 2 b) 4 c) 1 d) 7 **Ans.:**d

Explanation: union is a data type in which all the members are stored in the same location. The memory size of union is equalto the memory size of the highest member variable. Each members of union can be accessed one by one. In thiscase size of float is 4. So the size of the union is 4.

==. For which of the following, "PI++;" code will fail?

a) #define PI 3.14 b) char *PI = "A";
c) float PI = 3.14; d) none of the Mentioned **Ans.:** a

==. Which of the following declaration is not supported by C?

a) String str; b)char *str;
c) float str = 3e2; d) Both String str; & float str = 3e2; **Ans.:** a

==. Which among the following are the fundamental arithmetic operators, i.e, performing the desired operation can be done using that operator only?

a) +, – b) +, -, % c) +, -, *, / d) +, -, *, /, % **Ans.:** a

==. When double is converted to float, then the value is?

a) Truncated b) Rounded
c) Depends on the compiler d) Depends on the standard **Ans.:** c

KEY POINTS TO REMEMBER ABOUT POINTERS IN C:

- ✓ Normal variable stores the value whereas pointer variable stores the address of the variable.
- ✓ The content of the C pointer always be a whole number i.e. address.
- ✓ Always C pointer is initialized to null, i.e. int *p = null.
- ✓ The value of null pointer is 0.
- ✓ & symbol is used to get the address of the variable.
- ✓ * symbol is used to get the value of the variable that the pointer is pointing to.
- ✓ If a pointer in C is assigned to NULL, it means it is pointing to nothing.
- ✓ Two pointers can be subtracted to know how many elements are available between these two pointers.
- ✓ But, Pointer addition, multiplication, division are not allowed.
- ✓ The size of any pointer is 2 bytes (for 16-bit compiler).

C Dynamic Memory Allocation Functions

Function	Purpose
malloc	Allocates the memory of requested size and returns the pointer to the first byte of allocated space.
calloc	Allocates the space for elements of an array. Initializes the elements to zero and returns a pointer to the memory.
realloc	It is used to modify the size of previously allocated memory space.
Free	Frees or empties the previously allocated memory space.

Some Practices Question for M.C.Q:

- **What is the difference between ++a and a++?**
  "++a" is called prefixed increment and the increment will happen first on a variable. 'a++' is called postfix increment and the increment happens after the value of a variable used for the operations.
- **Describe the difference between "="and"==" symbols in C programming?**
  '==' is the comparison operator which is used to compare the value or expression on the left-hand side with the value or expression on the right-hand side.
  '=' is the assignment operator which is used to assign the value of the right-hand side to the variable on the left-hand side.
- **How many loops are in C programming?**
  There are 4 types of loop statements in C.
  - ✓ While loop
  - ✓ For Loop
  - ✓ Do…While Loop
  - ✓ Nested Loop
- **What is the incorrect operator form following list(== , <> , >= , <=) and what is the reason for the answer?**
  Incorrect operator is '<>'.This is the format correct when writing conditional statements, but it is not a correct operation to indicate not equal in C programming and it gives compilation error as follows.
- **What are the modifiers available in C programming language?**
  There are 5 modifiers available in C programming language as follows.
  - ✓ Short
  - ✓ Long
  - ✓ Signed
  - ✓ Unsigned
  - ✓ long long
- **What is preprocessor?**
  Preprocessor is a directive to the compiler to perform certain things before the actual compilation process begins.

- **What is the difference between Call by Value and Call by Reference?**
  When using Call by Value, you are sending the value of a variable as parameter to a function, whereas Call by Reference sends the address of the variable. Also, under Call by Value, the value in the parameter is not affected by whatever operation that takes place, while in the case of Call by Reference, values can be affected by the process within the function.
- **Is it possible to run program without main() function?**
  No
- **How many main() function we can have in our project?**
  1
- **Is it true that a function may have several declarations, but only one definition.**
  True
- **Difference between calloc() and malloc()**
  malloc() takes a single argument while calloc() needs two arguments
- **Total number of keywords in C are**
  32
- **rand() function returns**
  integer type
- **What is the purpose of getc()**
  read a character from a file
- **Is (*p) and **p is same?**
  No. *p point a single variable where **p is a pointer to a pointer variable, also called double pointer.
- **Difference between structure and union is**
  The way memory is allocated
- **printf() belongs to which library of c**
  stdio.h
- **Difference of getchar(), getc(),getche(), getch().**
  - getchar() - it reads from standard input and it is equivalent to getc(stdin). SYNTAX - int getchar(void);
  - getc() - it reads a single character from a given input stream and returns an integer value on success. It returns EOF on failure. SYNTAX - int getc(FILE *stream);
  - getche() - like getch() , this is also a non-standard function present in conio.h. It reads a single character from keyboard and displays immediately on output screen without waiting for enter key. SYNTAX - int getche(void);
  - getch() - it is a nonstandard function and id present in conio.h header file which is mostly used by MS-DOS compilers like turbo C. It is not a part of the C standard library. SYNTAX - int getch();
- **What is right way to Initialize array?**
  int num[6] = { 2, 4, 12, 5, 45, 5 };
- **What is the output of the following program?**

```
int main()
{
  int a[5] = { 5, 1, 15, 20, 25 };
  int i, j, m;
i = ++a[1];
  j = a[1]++;
  m = a[i++];
printf ("%d, %d, %d", i, j, m);
  return 0;
}
```

Ans.: 3, 2, 1

C programming previous year questions:

Who is known as the first computer programmer? *[Com. (AP)-2020]*

a) Alan Turing
b) Ada Lovelace
c) Charles Baddage
d) None of this

Ans.: b

What is the maximum value that can be stored in a 32-bit signed integer of C language? *[Com. (AP)-2020]*

a) 10^32 b) 2^32 c) 2^32 d) 2^31 - 1

Ans.: d

Suppose a C program has floating constant 1.414, what's the best way to convert it as a float data type? *[Combined (O-IT/ICT)-2019]*

a) (float)1.414 b) float(1.414) c) 1.414f or 1.414F d) None of these **Ans.:** c

Which of the declaration is correct? ***[Combined(O-IT/ICT)-2019]***

a) int length b) char int c)int long d) float double **Ans.:** a

An n*n armay v is defined as follows: v[i, j]=i-j for all i,j; 1<=i<=n, 1<=j<=n , the sum of the element of array v is *[Combined(O-IT/ICT)-2019]*

a) 0 b) n-1 c) n^2 -3n+2 d) n^2(n+1)/2 **Ans.:** a

An array contains the following letters, Color = {E, L,E,C,T,I,O,N) The value of the variable, E=3. Color [E] points to which value? *[Combined(SO-IT/ICT)-2018]*

a) E b) C c) T d) 1 **Ans.:** b

int C=10; System.out.println(C--); gives a output of ---- *[Combined(SO-IT/ICT)-2018]*

a)10 b) 11 c) 9 d) 8 Ans.: a

What is an example of iteration in C? *[Combined(AP)-2018]*

a) for b) while c) do-while d) all of the above **Ans.:**d

Which of the following doesn't require an & for the input in scanf()? *[Combined(AP)-2018]*

a) char name[10]; b) int name[10]; c) float name[10]; d) double name[10]; **Ans.:**a

int number[]={10,20,30,40,50}; number[3]=? *[SBL,JBL (SO-IT/ICT)-2018]*

a) 10 b) 20 c) 30 d) 40 **Ans.:**d

What is the final values of a and c in the following C statement? (initialize value a=2,c=1) c=c? a=0:2; *[Combined(AP)2018]*

a) a=0,c=0 b) a=2,c=2 c) a=2,c=2 d) a=1,c=2 **Ans.:** a

What is the length of character pointer in below code? *[ICB(AP)2017]*char *str="Hello"; printf("%d",strlen(str));

a) 3 b)5 c)2 d)undefined **Ans.:** b

Which control statement can be executed at least once? *[ICB(AP)2017]*

a) While b)for c) do—while d) All of the above **Ans.:**c

Which of the following cannot be checked in a switch-case statement? *[ICB(AP)2017]*

a) Character b)Integerc) Float d) None of the above **Ans.:** c

Which of the following will not increase the value of variable c by 1? *[BREB 2016]*

a) C++ b) C = C+1 c) C+1 >= C d) C+= 1 **Ans.:** c

Which is logical operator?

a) + b)>= c) AND d)<< **Ans.:** c

Which Format Specifier is used for typing double datatype?

a)%f b)%1f c)%d d)%s **Ans.:** b

SUMMARY

- 'C' was developed by Dennis Ritchie in 1972.
- It is a low programming level language close to machine language
- It is widely used in the software development field.
- It is a procedure and structure-oriented language.
- It has the full support of various operating systems and hardware platforms.
- Many compilers are available for executing programs written in 'C'.
- A compiler compiles the source file and generates an object file.
- A linker links all the object files together and creates one executable file.
- The main function is a mandatory part of every 'C' program.
- To use the functionality of a header file, we have to include the file at the beginning of our program.
- There are total 32 keywords.
- A constant is a value that doesn't change throughout the execution of a program.
- There are four commonly used data types such as int, float, char and a void.
- We can also nest if-else within one another when multiple paths have to be tested.
- Looping is one of the key concepts on any programming language.
- It executes a block of statements number of times until the condition becomes false.
- Loops are of 2 types: entry-controlled and exit-controlled.
- 'C' programming provides us 1) while 2) do-while and 3) for loop.
- A switch is used in a program where multiple decisions are involved.
- A switch must contain an executable test-expression.
- Each case must include a break keyword.

- A string is a sequence of characters stored in a character array.
- A character such as 'd' is not a string and it is indicated by single quotation marks.
- 'C' provides standard library functions to manipulate strings in a program. String manipulators are stored in <string.h> header file.
- Auto, extern, register, static are the four storage classes in 'C'.