Biyani Institute of Science & Management
I Internal Examination Sep. 2019
Class: MCA-I
Subject- Programming in C & C++(MCA-102)

| MM: 20 | Set: A- Solution | Time: 1½Hrs |

[I] Very Short Answer Questions (Max 40 words). (2*1=02)

1. What are the key features in C programming language?

Ans: Features of C language

- It is a robust language with rich set of built-in functions and operators that can be used to write any complex program.
- The C compiler combines the capabilities of an assembly language with features of a high-level language.
- Programs Written in C are efficient and fast. This is due to its variety of data type and powerful operators.
- It is many time faster than BASIC.
- C is highly portable this means that programs once written can be run on another machines with little or no modification.
- Another important feature of C program, is its ability to extend itself.
- A C program is basically a collection of functions that are supported by C library. We can also create our own function and add it to C library.
- C language is the most widely used language in operating systems and embedded system development today.

2. What is the difference between ++a and a++?

Ans:

++a	a ++
++a is called Pre Increment.	a++ is known as Post Increment
++a is pre increment because it increments a's value by 1 before the operation. It means j = a; will execute after a++.	a++ is post increment because it increments a's value by 1 after the operation is over.
first the increment is done and then value is assigned	first the value is assigned and then increment happens.

[II] Short Answer Questions (Max 80 words). (2*3=6)

1. What is Data Type in C?

Ans: Data types specify how we enter data into our programs and what type of data we enter. C language has some predefined set of data types to handle various kinds of data that we can use in our program. These datatypes have different storage capacities.

C language supports 2 different type of data types:

1. Primary data types:

These are fundamental data types in C namely integer(int), floating point(float), character(char) and void.

2. Derived data types:

Derived data types are nothing but primary datatypes but a little twisted or grouped together like array, stucture, union and pointer.

Integer type

Integers are used to store whole numbers.

Size and range of Integer type on 16-bit machine:

Type	Size(bytes)	Range
int or signed int	2	-32,768 to 32767
unsigned int	2	0 to 65535
short int or signed short int	1	-128 to 127
unsigned short int	1	0 to 255
long int or signed long int	4	-2,147,483,648 to 2,147,483,647
unsigned long int	4	0 to 4,294,967,295

Floating point type
Floating types are used to store real numbers.
Size and range of Integer type on 16-bit machine

Type	Size(bytes)	Range
Float	4	3.4E-38 to 3.4E+38
double	8	1.7E-308 to 1.7E+308
long double	10	3.4E-4932 to 1.1E+4932

Character type
Character types are used to store characters value.
Size and range of Integer type on 16-bit machine

Type	Size(bytes)	Range
char or signed char	1	-128 to 127
unsigned char	1	0 to 255

void type
void type means no value. This is usually used to specify the type of functions which returns nothing. We will get acquainted to this datatype as we start learning more advanced topics in C language, like functions, pointers etc.

2. What is Iteration?Give example of 'for loop'.
Ans: Iteration, in the context of computer programming, is a process wherein a set of instructions or structures are repeated in a sequence a specified number of times or until a condition is met. When the first set of instructions is executed again, it is called an iteration. When a sequence of instructions is executed in a repeated manner, it is called a loop.

The while statement evaluates a control expression before each execution of the loop body. If the control expression is true (nonzero), the loop body is executed. If the control expression is false (0), the while statement terminates. The while statement has the following syntax:
while (expression)

   statement
Consider the following while statement:
n = 0;
while (n < 10)
  {
   a[n] = n;
   n++;
  }

The do statement evaluates the control expression after each execution of the loop body. The do statement has the following syntax:
do
  statement
  while (expression) ;

The for statement evaluates three expressions and executes the loop body until the second controlling expression evaluates to false (0). The for statement is useful for executing a loop body a specified number of times. The for statement has the following syntax:
for (expression-1(opt) ;
   expression-2(opt) ; expression-3(opt))
  statement

[III] Long Answer Questions (Max 150 words).   **(2*6=12)**
1. Explain Tokens in detail.
Ans: A token is the smallest unit in a 'C' program. A token is divided into six different types as follows:
Keywords and Identifier
In 'C' every word can be either a keyword or an identifier.
Keywords have fixed meanings, and the meaning cannot be changed. They act as a building block of a 'C' program. There are total 32 keywords in 'C'. Keywords are written in lowercase letters.
Following table represents the keywords in 'C',

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

An **identifier** is nothing but a name assigned to an element in a program. Example, name of a variable, function, etc. Identifiers are the user-defined names consisting of 'C' standard character set. As the name says, identifiers are used to identify a particular element in a program. Each identifier must have a unique name. Following rules must be followed for identifiers:
1. The first character must always be an alphabet or an underscore.
2. It should be formed using only letters, numbers, or underscore.

3. A keyword cannot be used as an identifier.
4. It should not contain any whitespace character.
5. The name must be meaningful.

A **variable** is an identifier which is used to store some value. Constants can never change at the time of execution. Variables can change during the execution of a program and update the value stored inside it.
Following are the rules that must be followed while creating a variable:
1. A variable name should consist of only characters, digits and an underscore.
2. A variable name should not begin with a number.
3. A variable name should not consist of whitespace.
4. A variable name should not consist of a keyword.
5. 'C' is a case sensitive language that means a variable named 'age' and 'AGE' are different.

'C' provides various **data types** to make it easy for a programmer to select a suitable data type as per the requirements of an application. Following are the three data types:
1. Primitive data types
2. Derived data types
3. User-defined data types

There are five primary fundamental data types,
1. int for integer data
2. char for character data
3. float for floating point numbers
4. double for double precision floating point numbers
5. void

Data type	Size in bytes	Range
Char or signed char	1	-128 to 127
Unsigned char	1	0 to 255
int or signed int	2	-32768 to 32767
Unsigned int	2	0 to 65535
Short int or Unsigned short int	2	0 to 255
Signed short int	2	-128 to 127
Long int or Signed long int	4	-2147483648 to 2147483647
Unsigned long int	4	0 to 4294967295
float	4	3.4E-38 to 3.4E+38
double	8	1.7E-308 to 1.7E+308
Long double	10	3.4E-4932 to 1.1E+4932

Constants are the fixed values that never change during the execution of a program.

2. Write a Program to find Area and Circumference of Circle.

Ans:
```
#include<stdio.h>
#include<conio.h>
int main() {
float radius, area;
printf("\nEnter the radius of Circle : ");
scanf("%d", &radius);
```

```
        area = 3.14 * radius * radius;
        printf("\nArea of Circle : %f", area);
        return (0);
        }
o/p::   Enter radius of a circle : 1
        Area of circle : 3.14
        Circumference  : 6.28
```

[I] Very Short Answer Questions (Max 40 words).   **(2*1=02)**

1. Describe the header file and its usage in C programming?

Ans: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.

When we include header files in our C program using "#include <filename.h>" command, all C code of the header files are included in C program. Then, this C program is compiled by compiler and executed.

2. What are reserved words with a programming language?

Ans: Keywords are specific reserved words in C each of which has a specific feature associated with it. Almost all of the words which help us use the functionality of the C language are included in the list of keywords. So you can imagine that the list of keywords is not going to be a small one!

There are a total of 32 keywords in C:

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

[II] Short Answer Questions (Max 80 words).   **(2*3=06)**

1. What are Decision making statements?

Ans: The decision control statements are the decision making statements that decides the order of execution of statements based on the conditions. In the decision making statements the programmer specify which conditions are to be executed or tested with the statements to be executed if the condition is true or false. SOME OF THE DECISION CONTROL STATEMENTS ARE
if statement
if-else statement

nested if statements
switch statement
Let us discuss all these statements briefly.

IF STATEMENT

The if statement consists a condition which is followed by one or some of the statements, if the condition is true then the statements will be executed or else not. This statement is the simple and easy decision control statement.

if (condition)

{

//statements to be executed if condition is true

}

IF – ELSE STATEMENT

In the if-else statement the if statement is followed by the else statement which will execute when the expression is false.

if (condition)

{   //statement will execute if the condition is true

}

else

{   //statement will execute if the condition is false

}

SWITCH STATEMENT

The switch statement allows the variable to be tested for equality against a list of values. In the switch statement every value is called case and the variable is switched on is checked for each case.

switch(condition)

{   case constant expression:

statement;

break;   //it is optional

case constant expression:

statement;

break;   //it is optional

//you can have any number of cases

default: //optional

statement;

}
2. Write a program of Fibbonacci series.
Ans: #include <stdio.h>

```c
int main()
{
  int n, first = 0, second = 1, next, c;

  printf("Enter the number of terms\n");
  scanf("%d", &n);

  printf("First %d terms of Fibonacci series are:\n", n);

  for (c = 0; c < n; c++)
  {
    if (c <= 1)
      next = c;
    else
    {
      next = first + second;
      first = second;
      second = next;
    }
    printf("%d\n", next);
  }

  return 0;
}
```

[III] Long Answer Questions (Max 150 words).   **(2*6=12)**
1. Write a Program to calculate sum of natural numbers.
Ans: #include <stdio.h>

```c
    int main()
    {
  int n, i, sum = 0;

  printf("Enter a positive integer: ");
  scanf("%d",&n);
  for(i=1; i <= n; ++i)
  {
     sum += i;   // sum = sum+i;
  }
  printf("Sum = %d",sum);
  return 0;
}
```

2. What do you understand by operators?Explain the types of operater used in C & C++.
Ans: Operators are the foundation of any programming language. Thus the functionality of C/C++ programming language is incomplete without the use of operators. We can define operators as symbols that help us to perform specific mathematical and logical computations on operands. In other words we can say that an operator operates the operands.
C/C++ has many built-in operator types and they can be classified as:

Arithmetic Operators: These are the operators used to perform arithmetic/mathematical operations on operands. Examples: (+, -, *, /, %,++,−).

Arithmetic operator are of two types:

Unary Operators: Operators that operates or works with a single operand are unary operators.

For example: (++ , −)

Binary Operators: Operators that operates or works with two operands are binary operators.For example: (+ , − , * , /)

Relational Operators: Relational operators are used for comparison of the values of two operands. For example: checking if one operand is equal to the other operand or not, an operand is greater than the other operand or not etc. Some of the relational operators are (==, >= , <=).

Logical Operators: Logical Operators are used to combine two or more conditions/constraints or to complement the evaluation of the original condition in consideration. The result of the operation of a logical operator is a boolean value either true or false.

Bitwise Operators: The Bitwise operators is used to perform bit-level operations on the operands. The operators are first converted to bit-level and then calculation is performed on the operands. The mathematical operations such as addition , subtraction , multiplication etc. can be performed at bit-level for faster processing.

Assignment Operators: Assignment operators are used to assign value to a variable. The left side operand of the assignment operator is a variable and right side operand of the assignment operator is a value. The value on the right side must be of the same data-type of variable on the left side otherwise the compiler will raise an error.

Other Operators: Apart from the above operators there are some other operators available in C or C++ used to perform some specific task. Some of them are discussed here:

sizeof operator: sizeof is a much used in the C/C++ programming language. It is a compile time unary operator which can be used to compute the size of its operand. The result of sizeof is of unsigned integral type which is usually denoted by size_t. Basically, sizeof operator is used to compute the size of the variable. ‘

Comma Operator: The comma operator (represented by the token ,) is a binary operator that evaluates its first operand and discards the result, it then evaluates the second operand and returns this value (and type). The comma operator has the lowest precedence of any C operator. Comma acts as both operator and separator.

Conditional Operator: Conditional operator is of the form Expression1 ? Expression2 : Expression3 . Here, Expression1 is the condition to be evaluated. If the condition(Expression1) is True then we will execute and return the result of Expression2 otherwise if the condition(Expression1) is false then we will execute and return the result of Expression3. We may replace the use of if..else statements by conditional operators.