



SUMMER – 13 EXAMINATION

Model Answer

Subject Code:17212

Subject Name: Programming In 'C'

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q.1. Attempt any TEN of the following:

MARKS 20

a) Define array. List its types.

(1Mark -definition, 1Mark- types)

Array is a fixed size sequenced collection of elements of same data type.

Types of array:

One dimensional array

Two-Dimensional array

b) List all basic data types.

(Any 4, ½ Mark for each)

1.Integer

2.Float

3.Character

4.Boolean

5.Double

6.Long



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c) Give the syntax of conditional statement.

(1 Mark -syntax, 1Mark-explanation)

Syntax of conditional statement:

exp1?exp2:exp3

where exp1, exp2, exp3 are expressions . If exp1 is true then value is returned will be exp2 ,else the value returned will be exp3.

d) What is looping? List various looping constructs of C.

(1Mark-definition, 1Mark-list)

Looping:

C executes instructions or statements sequentially one after other and one instruction is executed only once. Sometimes it is required to execute same instructions again and again which are already executed. Such situation is called as looping.

various looping constructs of C:-

1. for loop
- 2.while loop
- 3.do-while loop

e) State Arithmetic and Logical operators.

(1Mark-Arithmetic operators, 1Mark - Logical operators)

Arithmetic Operators:

i) Arithmetic operators

Operator	Purpose
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulus



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ii) Logical operators

Operator	Meaning
&&	AND
	OR
!	NOT

f) State the limitations of pointers.

(Any 2, 1Mark-each)

1. Occupies more memory.
2. Null pointer reference.
3. Stores only address but not the value.

g) Define string. Give syntax of strlen() function.

(1Mark-definition, 1Mark-syntax)

String: String is a character array which is used to hold set of characters.

Syntax: `strlen(stringname);`

h) State the rules for variable declaration.

(Any 4, ½ Mark for each)

- 1) Key words of C cannot be used as variable names
- 2) Variable name must be of maximum 8 characters in length.
- 3) Variable name must start with alphabet or underscore.
- 4) It should not start with special symbol or digit(0-9)
- 5) It should not contain comma (,) or space in name.
- 6) It is recommended that always give meaningful names to variable name



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i) Give the syntax of input and output statement of C.

(1Mark-syntax of input statement, 1Mark - syntax of output statement)

Syntax of input statement:

```
scanf("control string",arg1,arg2,....,argn);
```

with variables names '&' sign is required. Control string consists of field specifications consist of % and data specifier.

Syntax of output statement:

```
printf("control string",arg1,arg2,.....argn");
```

j) What is function prototype? Give its example.

(1Mark-definition, 1 Mark-example)

Function prototype:

All identifiers in C need to be declared before they are used. For functions the declaration needs to be before the first call of the function. A function declaration includes the return type and the number and type of the arguments. This is also called the function prototype.

Function prototype should be declared before the main function.

Syntax:

```
returntype function_name(datatype ,datatype);
```

Where data type is the data type of arguments passed to the function, returntype represents data type that is returned by the function, function_name represents name of the function.

Ex: int sum (int, int);

k) Define recursive function.

(Defination-1Mark)

Recursive function is a recursion process by which a function calls itself repeatedly, until some specified condition has been satisfied.



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1) State use of break and continue statement.

(1Mark-use of break, 1Mark-use of continue)

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

Syntax: break;

Continue: It is used when it is required to skip the remaining portion of the loop but not the remaining iterations.

Syntax: continue;

Q.2. Attempt any FOUR of the following:

MARKS 16

a) Draw the structure of C program. Also give one example.

(Structure of c program-2Marks, example-2Marks)

Structure of C program:

Structure of c program

Document section
Link section
Definition section
Global Declaration Section
Main() function section
Sub program section

or

header files

void main()

{

Variable declaration;

Statements;

}

Example:

include <stdio.h>

void main()



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```
{  
    int a=10,b=5;  
    float c=5.0;  
    float d=a+b+c;  
    printf("addition is =%f",d);  
}
```

b. Write a C program to accept a number and check whether it is even or odd.

(Logic-2Marks, proper syntax-2Marks)

```
#include<stdio.h>  
void main()  
{  
    int n;  
    printf("Enter an integer\n");  
    scanf("%d",&n);  
    if ( n%2 == 0 )  
        printf("Even\n");  
    else  
        printf("Odd\n");  
}
```



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c) Distinguish between while and do-while loop.

(Any four difference – 4 Marks (1 Mark each))

While loop	Do while loop
While loop tests the condition before executing any of the statement with in the while loop	Do while loop tests the condition after having executed the statements with in the loop.
Syntax: while (test expression) { Statement 1; Statement 2; statement3; ... statement n; }	Syntax: do { statement1; statement2; statement3; ... statement n; } while (test expression);
When the loop is constructed using while loop, the condition in the loop will be checked first and then the control will go inside the loop	When the loop is constructed using do while loop, the statements inside the loop will be executed first and then the condition will be checked.
While will not execute its statements with in the loop if the condition fails for the first time.	Do while executes the statements with in the loop atleast once even if the condition fails for the first time.



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d) Differentiate between call-by-value and call-by-reference.

(Any four points, 1Mark each)

Call by value	Call by reference
Value of actual argument is passed to the formal arguments.	Instead of passing value, addresses are passed
Function operates only on value	Function operates on address rather than value
Any change made in formal argument doesnot affect the actual arguments	Any change made in formal argument does affect the actual arguments
Syntax: function_name(argument1,argument2,...,argumentn);	Syntax: function_name(&argument1,&argument2,...,&argumentn);
Example : add(a,b);	Example: add(&a,&b);

e) Write syntax of switch case statement and give its example.

(Syntax-2Marks, example-2Marks)

Switch case:

Syntax:

switch (expression or variable)

{

case constant 1 : statement block1

break;

case constant 2 : statement block2

break;

:

:

case constant n : statement block n

break;

default : default-statement;

break;

}



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Where the expression is the result in integer value, statementblock denotes sequence of statements, constant 1, constant2,...,constants represents constants, integer valued expression or character.

Example:-

```
#include<stdio.h>

void main()
{
char choice;

printf("Enter the choice\n");
scanf("%c",&choice);
printf("\n");
switch(choice)
{
case 'r': printf(" choice is r");
break;
case 'w': printf(" choice is w");
break;
case 's': printf(" choice is s");
break;
case 't': printf(" choice is t");
break;
default : printf("invalid choice");
}
```



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f) Define the terms:

(i) keyword (ii) identifier (iii) variable (iv) Constant

(1Mark each)

i) **Keyword:** keywords are reserved words of the language which has specific meaning and cannot be used as variable or constant names.

ii) **Identifier:** Identifier is used for naming variables, functions or labels.

iii) **Variable:** Variable is a user defined element that represents a memory location that can store a value.

iv) **Constant:** Constant is a value that does not change (i.e. fixed value)

Q.3. Attempt any FOUR of the following:

MARKS 16

a) Write a program to find whether year is leap year.

(4 Marks)

(Logic – 2 Marks, Syntax-2 Marks)

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

void main()
{
    clrscr();
    int year;
    printf("Enter the year");
    scanf("%d",&year);
    if(year%4==0)
    {
        printf("\n year %d is a Leap year",year);
    }
    else
    {
        printf("\n year %d is a not Leap year",year);
    }
}
```



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```
    getch();  
}
```

- b) State the use of increment & decrement operator. Give difference between i++ & ++i statement with example.**

(4 Marks)

- **Use of Increment and Decrement operator with Explanation**

(Use of increment, Decrement – 02 Marks (1 Mark each) Difference with example - 2Marks)

Increment operator (++) is used to increase the value by one.

Decrement operator (--) is used to reduce the value by one.

Eg.

++x is similar x=x+1 if x is 5 then after ++x or x++,x will become 6.

Or x++ is similar to x=x+1.

--y is similar to y=y-1 if y=5 then after --y or y--,y become 4.

Or y-- is similar to y=y-1

- **Difference between i++ & ++i with Example.**

1) Postfix increment operator (i++):

When postfix ++ or (--) is used with a variable in an expression ,the expression is evaluated first using the original value of the variable and then the variable is incremented (or decremented)by one.

Example:

```
main()  
{  
    int a,z,i=10,j=20;  
    a=i * j++;  
    z=i * j;  
    printf("\n a=%d z=%d",a,z);  
    getch();  
}
```



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Output:

a=200 z=210

2)Prefix Increment operator(++i):

When prefix ++ or-- is used in an expression ,the variable is incremented (or decrement) first and then the expression is evaluated using the new value of the variable

```
main()
{
int a,z,i=10,j=20;
a=i * ++j;
z=i* j;
printf("\n a=%d z=%d",a,z);
getch();
}
```

Output:

a=210 z=210

c) Write an iterative program to find factorial of a number.

(4 Marks)

Program to find factorial with any iterative loop

(Logic – 2 Marks, Syntax-2 Marks)

```
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
long int n,i,fact=1;
printf("Enter the number");
scanf("%ld",&n);
```



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```
for(i=1;i<=n;i++)  
{  
fact=fact*i;  
}  
printf("\n Factorial of a number is %ld",fact);  
getch();  
}
```

d) Explain nested –if construct with example.

(4-Marks)

(Syntax-1 Mark, Explanation-1 Mark, Example-2 Marks)

- When multiple conditions are introduced in a particular sequence, we may use nested if else statements
- The general form of nested if is as follows:

```
if(condition1)  
{  
  
if(condition 2)  
{  
Statement -1;  
}  
else  
{  
Statement-2;  
}  
}  
else  
{  
Statement-3;  
}  
Statement-x;
```



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- Explanation

When the loop enters in, condition 1 is checked, if it is true then it enters in the condition 2. Again the condition 2 is checked, if it is true then the statement 1 will be executed else statement 2 will be executed and the control is transferred to the statement x. Otherwise if the condition 1 is initially false, then the statement 3 will be executed and the control is transferred to the statement x.

- Example -program to find greatest among three nos.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a,b,c;
printf("Enter three values");
scanf("%d %d %d",&a,&b,&c);
if(a>b)
{
if(a>c)

{
printf("\n a is greatest=%d",a);
}
else
{
printf("\n c is greatest=%d",c);
}
}
else
{
if(c>b)
{
printf("\n c is greatest=%d",c);
}
}
```



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```
else
{
printf("\n b is greatest=%d",b);
}
}
getch();
}
```

e) Find the error in following prog. code & give corrected code:

(4 Marks)

```
int i,x;
for(i=0;i=10;i++)    //Possibly incorrect assignment.
{
x=i*2;                // 'x' is assigned a value that is never used
printf("%d, i);       //Undefined symbol print, Unterminated string or character constant.
}
```

(Each error 1/2 Mark=2 Marks, corrected code-2 Marks)

NOTE: errors written in their own language can be considered

- Errors in the above program
 - i) Possibly incorrect assignment.
 - ii) Undefined symbol print.
 - iii) Unterminated string or character constant.
 - iv) 'x' is assigned a value that is never used

- The corrected code is

```
#include<stdio.h>
#include<conio.h>
void main()
{
clrscr();
```



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```
int i,x;
for(i=0;i<=10;i++)
{
x=i*2;
printf("%d",x);      or    //printf("%d",i)
}
getch();
}
```

Output

02468101214161820

f) Write a program to print “Programming in C” upto user provided times.

(4 Marks)

(Logic – 2 Marks, Syntax-2 Marks)

```
#include<stdio.h>
#include<conio.h>
void main()
{

clrscr();
char str[20]="Programming in C";
int n,i;
printf("Enter the n");
scanf("%d",&n);
for(i=1;i<=n;i++)
{
printf("\n %s",str);
}
getch();
}
```




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Q.4. Attempt any FOUR of the following:

MARKS 16

a) What is structure in C? Give its syntax with example.

(4 Marks)

(Definition -1 Mark, Syntax-1 Mark, Example-2 Marks)

- Structure: Structure is the collection of elements of different data types.
- Syntax.

The general form of structure is

struct tag

{

Data type variable_name1;

Data type variable_name2;

.

.

Data type variable_namen;

};

Whereas struct is the keyword used to declare the structure

Tag is the name of the structure and all the variables should be enclosed in '{'

And '}' is used to terminate the declaration.

Example:

struct student

{

int roll_no;

char name[20];

}



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- The general form to declare the variable of structure.

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

- Program to declare structure student having data members roll & name. Accept and display the data.

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    struct student  
    {  
        int roll_no;  
        char name[20];  
    }s;  
    printf("enter roll no and name");  
    scanf("%d%s",&s.roll_no,&s.name);  
    printf("\n Roll no=%d name=%s",s.roll_no,s.name);  
    getch();  
}
```



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- b) Write a program to store records in a hotel as customer name, address, period of stay, type of room allotted & room charges.**

(4 Marks)

(Logic / Structure declaration– 2 Marks, Syntax-2 Marks)

```
#include<stdio.h>
#include<conio.h>
void main()
{
    struct hotel
    {
        char customer_name[20];
        char address[20];
        int period_of_stay;
        char types_of_room[10];
        int room_charges;
    }h[3];
    clrscr();
    int i;
    for(i=0;i<3;i++)
    {
        printf("enter customer name");
        scanf("%s",&h[i].customer_name);
        printf("enter address");
        scanf("%s",&h[i].address);
        printf("enter period of stay");
        scanf("%d",&h[i].period_of_stay);
        printf("enter types of room");
        scanf("%s",&h[i].types_of_room);
        printf("enter room charges");
        scanf("%d",&h[i].room_charges);
    }
}
```



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```
for(i=0;i<3;i++)
{
printf("\n customer name is %s",h[i].customer_name);
printf("\n Address = %s",h[i].address);
printf("\n Period of stay=%d",h[i].period_of_stay);
printf(" \n Types of stay=%s",h[i].types_of_room);
printf("\n Room charges=%d",h[i].room_charges);
}
getch();
}
```

c) Write a recursive program to print fibonacci series.

(4 Marks)

(Any correct function definition – 02 Marks, Syntax – 02 Marks)

```
#include<stdio.h>
#include<conio.h>
long int fib(long int n);
void main()
{
long int res,n;
int i;
printf("Enter the number of terms of the Fibonacci Series:\t");
scanf("%ld",&n);
for(i=0;i<n;i++)
{
res=fib(i);
printf(" %ld",res);
}
getch();
}
long int fib(long int n)
```



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```
{  
    long int res;  
    if(n==0||n==1)  
        return (n);  
    else  
        res=fib(n-1)+fib(n-2);  
    return(res);  
}
```

d) Give the syntax and use of following string functions:

(4 Marks)

(Each function -2 Marks)

i) strcmp()-(Syntax-1 Mark,use-1 Mark)

- The strcmp() is used to compare two strings with each others.If two strings are equal then the function returns 1 else it returns the difference between the two strings.
- Syntax.
 strcmp(string1,string2);

ii) strcat()-(syntax-1 mark,use-1 mark)

- The strcat() is used to join the two string
- Syntax
 strcat(string1,string2);

e) Define the term with example:

(4 Marks)

(Each term 2 Marks)

i) string:

(Definition-1 mark, Any one example-1 mark)

- Defination- string is the collection of characters
- Ex
 char name[20];
 Char name[25]="welcome to world of c";



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Char name[20]={'w','e','l','c','o','m','e',' ','t','o',' ','w','o','r','l','d',' ','c'};

ii) array:

(Definition-1 mark, any one Example-1 mark)

- Definition-Array is a collection of same type of elements arranged one by one in the sequence.
- Ex

int a[5];

int a[5]={ 10,20,30,40,50};

It tells the compiler that a is an integer array and can store 5 integers. The compiler reserve two bytes of memory for each integer array element.

f) Write the syntax of array declaration and initialization with example.

(4 Marks)

(Syntax for declaration-1 mark, Syntax for initialization -1 mark, Example-2 Marks)

- The syntax to declare array

Data type arr_name[size];

Ex

int a[5];

- The syntax to initialize an array

Data type arr_name[size]={list of values};

Ex

int a[5]={ 10,20,30,40,50};

The pictorial representation of the array

arr[0]	arr[1]	arr[2]	arr[3]	arr[4]
10	20	30	40	50



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- **Example**

```
#include<stdio.h>
#include<conio.h>
void main()
{
int a[5]={ 10,20,30,40,50},i;
for(i=0;i<5;i++)
{
printf("\n a[%d]=%d",i,a[i]);
}
getch();
}
```

Q.5. Attempt any FOUR of the following:

MARKS 16

a) Write a function to exchange the value of variables.

(Correct function definition – 04 Marks)

```
void swap(int x, int y)
{
    int t;
    t=x;
    x=y;
    y=t;
    printf("\n x=%d y=%d",x,y);
}
```



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b) List categories of function with prototype of each.

(List – 02 Marks, prototype – 02 Marks (½ Mark each))

Different categories of function with its prototype

- 1) Function with no arguments and no return values.

void func_name(void);

- 2) Function with arguments and no return values.

void func_name(int);

- 3) Function with no arguments and return values.

int func_name(void);

- 4) Function with arguments and return values.

int func_name(int);

c) Write a program using function to find product of two numbers.

(Any correct function definition – 02 Marks, Syntax – 02 Marks)

```
#include<stdio.h>
#include<conio.h>
void main()
{
    void product(void);
    clrscr();
    product();
    getch();
}
void product()
{
    int a=0,b=0;
    printf("\n Enter value of a & b:");
    scanf("%d%d", &a,&b);
    printf("\n Product of %d * %d=%d",a,b,a*b);
}
```




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d) Write a program to determine whether string is palindrome.

(Logic – 2 Marks, Syntax-2 Marks)

```
#include<stdio.h>
#include<conio.h>
void main()
{
    inti=0,j=0;
    charstr[10];
    int flag=0;
    clrscr();
    printf("Enter the string");
    scanf("%s",str);

    while(str[i]!=NULL)
    {
        i++;
    }
    i--;
    while(j!=i)
    {
        if(str[i]==str[j])
        {
            flag=1;
        }
        else
        {
            flag=2;
        }
        break;
    }
    j++;
    i--;
```



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```
    }  
    if(flag==1)  
    {  
        printf(" %s is palindrome",str);  
    }  
    else  
    {  
        printf(" %s is not palindrome",str);  
    }  
    getch();  
}
```

e) **State the use of strcpy() function. Give its syntax with example.**

(Use of strcpy()- 02 Marks, syntax with example – 02 Marks)

The strcpy() copies the contents of one array into another. It takes two arguments that is one will be the source array, whose values are to be copied and second will be the destination array, into which the string will be copied.

Syntax: strcpy(str1,str2);

Here str2 will get copy on str1.

Example:

```
#include<stdio.h>  
#include<conio.h>  
void main()  
{  
    char str1[10]="Hi",str2[10]="Hello";  
    strcpy(str1,str2);  
    printf("str1=%s,str2=%s",str1,str2);  
    getch();  
}
```



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f) Write a program to find simple interest using structure.

(Logic – 2 Marks, Syntax-2 Marks)

```
#include<stdio.h>
#include<conio.h>
void main()
{
    struct Simple_Interest
    {
        float p,r,t,si;
    }s;
    clrscr();
    printf("Enter principal amount ");
    scanf("%f",&s.p);

    printf("Enter rate of interest ");
    scanf("%f",&s.r);
    printf("Enter time ");
    scanf("%f",&s.t);
    s.si=(s.p*s.r*s.t)/100;
    printf("Simple Interest = %f",s.si);
    getch();
}
```



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Q.6. Attempt any FOUR of the following:

MARKS 16

a) Define pointer. State and describe pointer operators.

(Definition – 02 Marks, pointer operators – 02 Marks (1 Mark each))

Pointers are variables used to store the memory addresses of the variables. Variables store the values and pointers stores their addresses at which these variables are located. The values stored in the pointers are integer values.

C provides two pointer operators which are

(a) Address of Operator &

(b) Indirection Operator *

The Address of Operator &:

The & is a unary operator that returns the memory address of its operand. For example, if var is an integer variable, then &var is its address. This operator has the same precedence and right-to-left associativity as the other unary operators.

You should read the & operator as "**the address of**" which means **&var** will be read as "the address of var".

Example : ptr=&m;

The Indirection Operator *:

The second operator is indirection Operator *, and it is the complement of &. It is a unary operator that returns the value of the variable located at the address specified by its operand.

Example: *ptr=m;

b) List different pointer arithmetic operations. Give example of each.

(list – any 4 operations ½ Mark each, Example - 02 Marks)

Different arithmetic operations are:

1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Increment
6. Decrement



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Example:

Suppose p1 and p2 are two pointers.

p1=&a;

p2=&b;

Addition - *p1 + *p2

Subtraction - p1-p2

Multiplication - *p1*5

Division - *p1/ *p2

Increment - ++p1

Decrement - -p1

c) Explain how pointers are used in call-by-reference method of function.

(Explanation with example- 04 Marks)

The **call by reference** method of passing arguments to a function copies the reference of an argument into the formal parameter. Inside the function, the reference is used to access the actual argument used in the call. This means that changes made to the parameter affect the passed argument.

To pass the value by reference, argument reference are passed to the functions just like any other value. So accordingly you need to declare the function parameters as reference types as in the following function add(), which add 1 to pos numbers by its arguments.

// function definition to add the values.

```
int add(int *p)
{
    inti=0;
    int sum=0;
    for(i=1;i<=(*p);i++)
    {
        sum=sum+i;
    }
    return sum;
}
```



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Now pass this add function into the main program

```
#include<stdio.h>
#include<conio.h>
void main()
{
    int *ptr,pos=0;
    printf("\n Enter position:");
    scanf("%d",&pos);

    ptr=&pos;
    printf("Sum=%d",add(ptr));
    getch();
}
```

d) Write output of the following prog. code:

```
main()
{
    int a,b,*ptr;
    ptr=&a;a=9;
    b=*ptr;a++;
    printf("a=%d,*ptr=%d,b=%d\n",a,*ptr,b);
}
```

(1 Mark to each output, correct format 1 Mark)

Ans:

a=10,*ptr=10,b=9



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e) Write a program in C using pointer to determine length of a string.

(Logic – 2 Marks, Syntax-2 Marks)

```
#include<stdio.h>
#include<conio.h>
int length(char *);
void main()
{
    char *ptr,str[10];
    clrscr();
    printf("\n Enter the string");
    scanf("%s",str);
    ptr=&str[0];
    printf("\n Length of string=%d",length(ptr));
    getch();
}

int length(char *p)
{
    int count=0;
    while(*p!=NULL)
    {
        count++;
        p++;
    }
    return count;
}
```



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f) State meaning of following statements with respect to pointers:

```
int *ptr,m=8;
```

```
*ptr=m;
```

```
ptr=&m;
```

(First statement – 02 Marks, second and third 1 mark each)

```
int *ptr,m=8;
```

In this statement the pointer variable ptr is declared. int indicates that the data type of ptr is of type integer. And variable m is also of type integer and value assign to it is 8.

```
*ptr=m;
```

In this statement value of variable m is assign to pointer variable.

```
ptr=&m;
```

ptr is pointer variable which stores the address of variable m.