**Programming in C - CS3251**

**PART-A**

**UNIT 1 BASICS OF C PROGRAMMING**

1.What are the different data types available in “C”? (May 14)

There are four basic data types available in C.

 int

 float

 char

 double

2.What is an Operator, Operand and Keywords?

 Operator

 An operator is a symbol that specifies an operation to be performed on operands.

Example: \*, +, -, / are called arithmetic operators.

 Operand

 The data items that operators act upon are called operands. Example: a+b; In this

statement a and b are called operands.

 Keywords

 Keywords are certain reserved words that have standard and pre-defined

meaning in C. These keywords can be used only for their intended purpose.

Define Constants in C. Mention the types.

The constants refer to fixed values that the program may not alter during its execution.

These fixed values are also called literals. Constants can be of any of the basic data types

like an integer constant, a floating constant, a character constant, or a string literal. There

are also enumeration constants as well. The constants are treated just like regular

variables except that their values cannot be modified after their definition.

What are Ternary operators or Conditional operators? (or) Give an Example for

Ternary operator. (Nov/Dec 14)

Ternary operators is a conditional operator with symbols ? and :

Syntax: test ? expression1 : expression2

 test-Any Boolean expression.

 expression1-An expression returned if test is true.

 expression2-An expression returned if test is false.

#include<stdio.h>//Header File

void main()//Main function of every C program

{

int a,b,c;

clrscr();

printf("Enter the values of a and b:");

scanf("%d%d" ,&a,&b

c = a>b ? a : b; //Ternary operator

printf("Larger number=%d" ,c);

}

Output

Enter the values of a and b:30 90

Larger number=90

What are the Bitwise operators and logical operators available in C ?

 Bitwise operators

 Bitwise AND, | - Bitwise OR, ~ - One„s Complement, >> - Right shift, << - Left

shift,

 ^ - Bitwise XOR are called bit field operators.

 Example: k=~j; where ~ take one„s complement of j and the result is stored in k.

 Logical operators

 The logical operators available in C are &&- Logical AND, || - Logical OR, ! -

Logical NOT

Whatis a Variable? Illustrate it with an example. (Nov/Dec 14)

 A variable is a data name used for storing a data value.

 Can be assigned different values at different times during program execution.

 Can be chosen by programmer in a meaningful way so as to reflect its function in the

program.

 Example: int i, num; //i, num are variables that can store integer values

What is the difference between Logical AND and Bitwise AND?

 Logical AND (&&): Only used in conjunction with two expressions, to test more

than one condition. If both the conditions are true the returns 1. If false then return 0.

 AND (&): Only used in Bitwise manipulation. It is a unary operator.

What is the importance of keywords in C. (May 15)

C programs are constructed from a set of reserved words which provide control and

from libraries which perform special functions. The basic instructions are built up using

a reserved set of words, such as main, for, if, while, default, double, extern, for, and int,

etc., C demands that they are used only for giving commands or making statements.

What is type casting?

Type casting is the process of converting the value of an expression to a particular data

type.

Example:

int x, y; c = (float) x/y; where a and y are defined as integers. Then the result of x/y is

converted into float.

What are various types of C operators? (Jan 14)

 Arithmetic Operators

 Increment and Decrement Operators

 Assignment Operators

 Relational Operators

 Logical Operators

 Conditional Operators

 Bitwise Operators

What are the I/O Functions in C? (May 15, Jan 16)

 Formatted I/O Statements

 scanf(),printf()

 Unformatted I/O Statements:

 getchar(), putchar(), gets(), puts()

**UNIT -2 (ARRAYS and STRINGS)**

1.Define scanf() function:

Scan f () function is used to read the value from the input device.

2.Define printf () function:

Print f ()function is used to display data on the monitor.

3.Define decision making statement:

These statements are used to execute particular set of instruction for based on certain

condition.

Ex:if, if else, nested if, if else if ladder, switch.

4.Define looping statement :

Looping statement are used to execute a group of instruction repeatedly at till some

condition is satisfied.

Example: while, do while, for loop.

5.Define unconditional statement:

This condition is used to transfer the control to other statement without checking any

condition.

Example : goto, break.

6.Define simple if statement:

It is used to execute some statements for a particular condition.

7.Define switch statement :

Switch statement is the simple form of if....else..... If ladder construct. Switch statement

is a multi branch decision statement.

8.Define for statement :

The for loop is entry controlled loop that provides a more concise loop control structure.

9.Define goto statement:

Goto statement can transfer the control to any place in a program. It is useful to provide

branching within a loop.

10.Define break statement:

Break statement exit from the loop can be accomplished by using the break statement.

11.Define exit statement:

It is used to terminate the program it is same as break statement.

12.what is getchar() :

Getchar () function is used to read one character at a time from the standard input

device.

13.Define putchar() :

Single character can be displayed using the function putchar(). The function putchar()

stands for “putchar”and uses an argument.

14. Define Array

Array is a collection of similar type of values

All values are stored in continuous memory locations

All values share a common name

Linear data structure. The elements are organized in a sequential order.

15. Name any two library functions for handling string

strlen() – finds the length of a string. It returns an integer value. It counts the no. of

characters except null character & returns the count

strlen(str)

strcpy() – copies the source string into destination string. So, the source string should

be enough to store the destination string.

strcpy(source,destination)

3. Declare a float array of size 5 and assign 5 values to it

Declaration : float price[5];

Initialization : float price[5]={200.50,150.25,25.5,55.75,40.00}; (or)

float price[]={1.2,3.4,6.5,7.8,9.8};

4. Give an example for initialization of string array

String is a character array.

Collection of one or more characters- enclosed with in double quotes

Declaration : char name[10];

Initialization : char name[10]=‖India‖;

car name[10]={ ̳I‘,‘n‘,‘d‘,‘i‘,‘a‘};

The char array is terminated by ̳\0‘

5. How a character array is is declared

Declaration : char name[n];

This array can store n-1 characters.

Initialization : char name[10]=‖India‖;

car name[10]={ ̳I‘,‘n‘,‘d‘,‘i‘,‘a‘};

The char array is terminated by ̳\0‘

6. Write example code to declare two dimensional array

Two dimensional array is an array with two subscript values. First subscript specifies the

row & second subscript specifies the column. Used to process matrix operations.

Declaration : datatype array\_name [r][c];

7. What is mean & median of a list of elements?

Mean : Average of the N elements can be computed by

sum of N elements/N

Ex: 2,1,3,4,5

Mean = (2+1+3+4+5)/5 = 3

Median : Middle element of a list. To find the median, the list must be sorted first.

If N is odd then Median= (N+1)/2

Ex: 1,2,3,4,5

Median= 6/2 . The element at 3rd position is the median

If N is even then then Median is the average of

Median= (a[(N+1)/2]+a[(N-1)/2])/2

Ex: 1,2,3,4,5,6

Median=(a[3]+a[2])/2

=4+3/2

=3.5

8. Define Searching

Searching is a process of finding the position of a given element in a list. The searching

is successful if the element is found. There are two types of searching.

Linear Search

Binary Search

9. Define Sorting

Sorting is a process of arranging the elements either in ascending order or descending

order.

10. Sort the following elements using selection sort method. 23,55,16,78,2

Step1:Find smallest element in the list & exchange the element with first element of the

list

2,55,16,78,23

Step2: Find second smallest value & exchange it with the second element of the list

2,16,55,78,23

Step 3: Continue the process until all the elements are arranged in the order

2,16,23,78,55

Step 4: 2,16,23,55,78

**UNIT 3 FUNCTIONS AND POINTERS**

What is meant by Recursive function?

If a function calls itself again and again, then that function is called Recursive function.

2. What is a Pointer? How a variable is declared to the pointer?

Pointer is a variable which holds the address of another variable.

Pointer Declaration: datatype \*variable-name;

Example: int \*x, c=5; x=&a;

3. What are the uses of Pointers?

Pointers are used to return more than one value to the function, Pointers are more

efficient in handling the data in arrays, Pointers reduce the length and complexity of the

program, They increase the execution speed, The pointers saves data storage space in

memory

4. What are \* and & operators means?

„\*‟ operator means „value at the address‟ „&‟ operator means „address of‟

5. Whatis meant by Preprocessor?

Preprocessor is the program, that process our source program before the compilation.

6. How can you return more than one value from a function?

A Function returns only one value. By using pointer we can return more than one value.

7. Is it possible to place a return statement anywhere in „C‟ program?

Yes. The return statement can occur anywhere.

Whatis stack trace?

A "stack trace" is a list of which functions have been called, based on this information.

When you start using a debugger, one of the first things you should learn is how to get a

stack trace. The stack is very inflexible about allocating memory; everything must be

deallocated in exactly the reverse order it was allocated in.

12. What is meant by Recursive function?

If a function calls itself again and again, then that function is called Recursive function.

13. What is the difference between NULL and NUL?

NUL is the name of the first character in the ASCII character set. It corresponds to a zero

value. There's no standard macro NUL in C, but some people like to define it. NULL can

be defined as ((void\*)0), NUL as '\0'. Both can also be defined simply as 0. If they're

defined that way, they can be used interchangeably.

14. What is a "null pointer assignment" error? What are bus errors, memory faults, and

core dumps?

Null pointer assignment is a message you might get when an MS-DOS program finishes

executing. Some such programs can arrange for a small amount of memory to be

available "where the NULL pointer points to" (so to speak). If the program tries to write

to that area, it will overwrite the data put there by the compiler. When the program is

done, code generated by the compiler examines that area. If that data has been changed,

the compiler-generated code complains with null pointer assignment.

15. Write the syntax for including functions?

The syntax for including functions in program is

return\_type function\_name(datatype var1, datatype var2,...);

//FUNCTION DECLARATION

int main()

{

variable\_name = function\_name(var1, var2, ...);

//FUNCTION CALL

.....

Return 0;

}

return\_type function\_name(datatype var1, datatype var2,...)

//FUNCTION DEFINITION

{

.....

statements

......

return(variable);

}

16. Whatis Pointer Arithmetic?

A pointer is an address, which is a numeric value. Therefore, you can perform

arithmetic operations on a pointer just as you can on a numeric value. There are four

arithmetic operators that can be used on pointers: ++, --, +, and -.

17. How does free() know how much memory to release?

There's no standard way. It can vary from compiler to compiler, even from version to

version of the same compiler. free(), malloc(), calloc(), and realloc() are functions; as long

as they all work the same way, they can work any way that works.

Can math operations be performed on a void pointer?

No. Pointer addition and subtraction are based on advancing the pointer by a number of

elements. By definition, if you have a void pointer, you don't know what it's pointing to,

so you don't know the size of what it's pointing to. If you want pointer arithmetic to

work on raw addresses, use character pointers.

19. What is a void pointer?

A void pointer is a C convention for "a raw address." The compiler has no idea what

type of object a void pointer "really points to." If you write

int \*ip;

ip points to an int. If you write void \*p; p doesn't point to a void!

20. Whatis indirection?

If p is a pointer, the value of p is the address of the object. \*p means "apply the

indirection operator to p"; its value is the value of the object that p points to. \*p is an

lvalue; like a variable, it can go on the left side of an assignment operator, to change the

value. If p is a pointer to a constant, \*p is not a modifiable lvalue; it can't go on the left

side of an assignment.

21. Whatis the difference between far and nearpointers?

Compilers for PC compatibles use two types of pointers.

 near pointers are 16 bits long and can address a 64KB range. far pointers are 32 bits

long and can address a 1MB range.

 near pointers operate within a 64KB segment. There's one segment for function

addresses and one segment for data.

**UNIT 4 STRUCTURES AND UNION**

1. Whatis a structure? (or) State the meaning ofthe root word struct. (May 15,18)

 It‟s a User defined data type

 Can hold many data objects of different data types (heterogeneous) may contain the

integer elements, float elements and character elements. etc.

 Collection of variables under single name

 Can conveniently used to represent a record

2. Give syntax for structure definition

Syntax:

[storage class specifier][data type] struct [structure name]

{

Data \_type memeber\_name[, member name 2,..];

Data \_type memeber\_name[, member name 2,..];

}[variable name];

Example:

struct Books

{

char title[50];

char author[50];

char subject[100];

int book\_id;

} book;

3. Define structure declaration.

 Variables/constants for structure types can be declared at definition or after

definition

 [storage class specifier] struct named\_Structure-type identifier name

[=initialization list];

 Struct key word mandatory

 A structure must end with a semicolon

Example: Declare variables Book1,Book2 of type Books

struct Books Book1;

struct Books Book2;

4. Write the rules for declaring a structure?

 A structure must end with a semicolon

 Struct key word mandatory

 Each structure member must be terminated.

 The structure variable must be accessed with dot(.) operator.

 Structure decaration list (structure members):

1. Can have char, float, double, int, array[], pointer\* other structure types

2. Cannot have void, function type, same structure instance

3. Can have pointer to an instance of itself which is called as self referential

structures.

5. Write the three ways to pass structure variables.

 Pass each member of the structure as an actual argument of the function call.

 Pass a copy of the entire structure to the called function

 Through pointer pass the structure as an argument.

6. How structure elements can be accessed?

Structure members can be accessed using

1. Direct member access operator/dot operator

 Represented as (.)

 It‟s a Binary Operator

 Syntax: Structure\_name.structure\_member\_name

2. Indirect member access operator/arrow operator

 Represented as (->)

 It‟s to access structure members by the pointer to the structure

 Syntax: Pointer\_to\_Structure->structure\_member\_name

8. Give rules for initializing structure

 The individual data members of the structure cannot be initialized.

 The structure variables can be initialized at compile time only.

 The order of data members in a structure must match the order of values in enclosed

brackets.

 We can initialize only some of the data members of the structure.

 The uninitialized data members can be initialized by default with zero(0) for int and

float 0.0 and „\0‟ for character and strings.

9. Define nested structure.

 Structure within another structure is called as nested structure

 Used to create complex data types

 Nested Structures contain declaration of members of other structure types

 We can also define a structure within declaration list of another structure

 Double braces used to initialize nested structure objects

 Eg: emp={name,salary,{date of birth}};

 It is used to increase the readability of the program by reducing the complexity.

10. Define the Structure called ID\_card to hold the details of the student. (Jan 16)

struct ID\_card

{

char name[50];

char address[50];

int age;

} b1,b2;

11. What are self-referential structures?

A structure consisting of at least a pointer member pointing to the same structure is

known as self-referential structure.

Example: struct Books

{

int book\_id;

struct Books\* ptr; };//ptr is a pointer pointing to structure type Books

14. Explain typedef with syntax and an example. (or) Specify the use of typedef. (Nov 18)

typedef is a keyword used in C language to assign alternative names to existing types.

Its mostly used with user defined data types, when names of data types get slightly

complicated.

Syntax:

typedef existing\_name alias\_name

Example:

typedef unsigned long ulong;

15. Explain array of structures with an example.

Declaring an array of structure is same as declaring an array of fundamental types. Since

an array is a collection of elements of the same type. In an array of structures, each

element of an array is of the structure type.

Example:

struct car

{

char make[20];

char model[30];

int year;

};

16. Define Singly Linked list.

Singly Linked Lists are a type of data structure. It is a type of list. In a singly linked

list each node in the list stores the contents of the node and a pointer or reference to the

next node in the list. It does not store any pointer or reference to the previous node.

Example:

struct node{

int data;

struct node \*next; };

17. Define dynamic memory allocation functions and list its types.

The process of allocating memory during program execution is called dynamic memory

allocation.

C language offers 4 dynamic memory allocation functions. They are,

1. malloc()

2. calloc()

3. realloc()

4. free()

18. Explain malloc with its syntax.

 malloc () function is used to allocate space in memory during the execution of the

program.

 malloc () does not initialize the memory allocated during execution. It carries

garbage value.

 malloc () function returns null pointer if it couldn‟t able to allocate requested amount

of memory.

Syntax

malloc (number \*sizeof(int));

19. Explain calloc with its syntax.

 It allocates multiple blocks of requested memory. calloc () initializes the allocated

memory to zero

 Calloc () function is also like malloc () function. But calloc () initializes the allocated

memory to zero. But, malloc() doesn‟t.

Syntax

calloc (number, sizeof(int));

**UNIT 5 FILE PROCESSING**

1. What is a File?

A File is a collection of related information that is permanently stored on the disk and

allows us to access and alter the information whenever necessary.

2. How do you open a file?

The File is opened by the statement

fp=fopen(“file-name”,”mode”);Where „fp‟ means file pointer, mode is the

file opening mode such as write, read, or append mode.

3. How do you close a file?

The file is closed by the statement fclose(file-pointer);

4. Mention any five file functions. (Jan 14)

fopen() :Creates a new file for use Opens a new existing file for use

fclose() : Closes a file which has been opened for use

fprintf() : Writes a set of data values to a file

fscanf() : Reads a set of data values from a 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 beginning of the file.

5. What is the use of rewind () function?

This function is used to reset the pointer to the beginning of the file.

6. What do you mean by Command line arguments? (or) What does argv and argc

indicate in command-line argument? (May 18,19)

The main functions can have arguments passed which are called as command line

arguments. There are two command line arguments:Argument count denoted by argc

and Argument vector denoted by argv

The argc is an integer variable which denotes the number of parameters passed and argv

is pointer to array of character strings. The syntax is as follows:

main( int argc , char \* argv[ ])

{

.....

}

It can also be returned as

main(argc,argv)

int argc;

char \* argv[];

{

....

}

7. What is sequential access file?

To reading or writing data records in sequential order, that is, one record after the other.

To read record 10, for example, you would first need to read records 1 through 9.

8. What is Random access file?

To the ability to access data at random. The opposite of random access is sequential access.

To go from point A to point Z in a sequential-access system, you must pass through all

intervening points. In a random-access system, you can jump directly to point Z.

9. Define what is the advantage of a random access file?

If the amount of data stored in a file is fairly large, the use of random access will allow

you to search through it quicker. If it had been a sequential access file, you would have

to go through one record at a time until you reach the target data. A random access file

lets you jump directly to the target address where data is located.

10. Define How do you search data in a data file using random access method?

Use the fseek() function to perform random access input/ouput on a file. After the file

was opened by the fopen() function, the fseek would require three parameters to work: a

file pointer to the file, the number of bytes to search, and the point of origin in the file.

11. Write a program in C language to create a data file.

#include <stdio.h>

void main()

{

FILE \*fptr;

fptr = fopen("emp.rec", "w");

fclose(fptr);

}

12. What is the use of fseek() function?

This function is used for seeking the pointer position in the file at the specified byte.

Syntax: fseek( file pointer, displacement, pointer position);

Where

file pointer -It is the pointer which points to the file.

displacement -It is positive or negative. This is the number of bytes which are skipped

backward (if negative) or forward( if positive) from the current position. This is attached

with L because this is a long integer.

13. Write a program to copy contents of input.txt file to output.txt file.

#include<stdio.h>

#include<conio.h>

#include<stdlib.h>

void main() {

FILE \*fp1, \*fp2;

char ch;

clrscr();

fp1 = fopen("Sample.txt", "r");

fp2 = fopen("Output.txt", "w");

while (1) {

ch = fgetc(fp1);

if (ch == EOF)

break;

else

putc(ch, fp2);

}

printf("File copied Successfully!");

fclose(fp1);

fclose(fp2);

}

14. Why ftell() method is used in C files?

This function returns the value of the current pointer position in the file. The value is

count from the beginning of the file.

Syntax: ftell(fptr);

Where fptr is a file pointer.

15. Compare Text file and Binary file.

 Text file is human readable because everything is stored in terms of text. In binary

file everything is written in terms of 0 and 1, therefore binary file is not human

readable.

 A newline(\n) character is converted into the carriage return-linefeed combination

before being written to the disk. In binary file, these conversions will not take place.

 In text file, a special character, whose ASCII value is 26, is inserted after the last

character in the file to mark the end of file. There is no such special character present

in the binary mode files to mark the end of file.

 In text file, the text and characters are stored one character per byte. For example, the

integer value 1245 will occupy 2 bytes in memory but it will occupy 5 bytes in text

file. In binary file, the integer value 1245 will occupy 2 bytes in memory as well as in

file.

16. Define File Pointer in C.

 To access any file, we need to declare apointer to FILE structure and then associate it

with the particular file.

 This pointer is referred to as file pointer.

Syntax to declare file pointer: FILE \* fp;

17. List down functions for reading and writing data of a file.

 Reading or writing characters using fgetc() and fputc() functions.

 Reading or writing string using fgets() and fputs() functions.

 Reading or writing integers using getw() and putw() functions.

 Reading or writing formatted IO using fscanf() and fprintf() functions.

 Reading or writing records using fread() and fwrite() functions.

18. Whatis purpose of library function feof()?

feof() function is a file handling function in C programming language which is used to

find the end of a file. Syntax: int feof(FILE \*fp);

19. Write aboutthe basic operations on files?

 Naming a file

 Opening a file

 Reading data from file

 Writing data into file

 Closing a File

20. How can you restore a redirected standard streams?

C library functions named dup() and fdopen(), you can restore a standard stream such

as stdout to its original state. The dup() function duplicates a file handle. You can use

the dup() function to save the file handle corresponding to the stdout standard stream.

The fdopen() function opens a stream that has been duplicated with the dup() function.

21. Why files are needed? (May 19)

 When a program is terminated, the entire data is lost. Storing in a file will preserve

your data even if the program terminates.

 If you have to enter a large number of data, it will take a lot of time to enter them all.

However, if you have a file containing all the data, you can easily access the contents

of the file using a few commands in C.

 You can easily move your data from one computer to another without any changes.