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| **CSE115: Programming Language I**  **Assignment – 02**  **Total Marks: 100** |

**Question 1:** What is Recursion? How does a Recursive function work? What is the advantage and disadvantage of using Recursion? What is the general Syntax of a Recursive code in c?

**Question 2:** What is the common cause of a stack overflow error? Given a sequence

2, 8, 32, 128, 512, 2048, …

Now, write a recursive function that can find the value of the nth number of this series.

|  |  |
| --- | --- |
| Input (nth Number) | Output (Value) |
| 3 | 128 |
| 4 | 512 |

Solve the same problem without using recursion. Express your opinion which solution is better and why?

**Question 3:** What is the output of the following program when N = 8? Explain what would happen if you gave N = 0 or any other Negative number?

#include<stdio.h>

int recFunction(int n){

if (n == 1)

return 0;

else

return 1+recFunction (n/2);

}

int main(){

int N;

printf("Enter a Number: ");

scanf("%d", &N);

printf("O/p: %d\n", recFunction(N));

return 0;

}

**Question 4:** Write a C program to check if a given number is prime number or not using Recursion.

**Question 5:** Write a C program to calculate the Factorial of a number using Recursion.

**Question 6:** What do you understand by a pointer? What are & and \* operators? Write a program in C to demonstrate the use of the & and \* operators.

**Question 7:** Write a C program to swap the elements of 4 variables using Pointers. And you must use a function to implement the swap operation.

**Question 8:** Write only the recursive functions for the following problems:

1. To print a string in reverse order using Recursion.
2. To find the sum of digits of a number using Recursion.

**Question 9:** Suppose an array x[ ] = {12, 22.0, 6.0, 3.5, 3.0, 16.0, 18.0, -43.5} is given. Now fill-up the following table with output and explanation as shown in the 2nd row of the table.

|  |  |
| --- | --- |
| **Statement** | **Explanation** |
| i = 6; |  |
| printf("%d %.1f\n", 6, x[3]); | *Prints 6 and 3.5 (value of x[3])* |
| printf("%d %.1f\n", i, x[i]); |  |
| printf("%.1f\n", x[i] + 5); |  |
| printf("%.1f\n", x[i] + i); |  |
| printf("%.1f\n", x[i + 1]); |  |
| printf("%.1f\n", x[i + i]); |  |
| printf("%.1f\n", x[1 \* i]); |  |
| printf("%.1f\n", x[1 \* i - 3]); |  |
| printf("%.1f\n", x[(int)x[3]]); |  |
| printf("%.1f\n", x[i++]); |  |
| printf("%.1f \n", x[--i]); |  |
| x[i - 1] = x[i]; |  |
| x[i] = x[i + 2]; |  |
| x[i] - 1 = x[i]; |  |

**Question 10:** Debug and Explain what the following program is doing:

#include <stdio.h>

int main(){

int arr1[25], i,n;

printf("Input the number of elements for the array: ");

scanf("%d", &n);

printf("Enter the %d elements of the Array:\n",n);

for(i=0;i<n;i++){

printf("At Index-%d: ", i);

scanf("%d", arr1+i);

}

printf("\nThe elements you entered are: \n");

for(i=0;i<n;i++)

printf("At Index-%d: %d\n", i, \*(arr1+i));

return 0;

}

**Question 11:** What is a structure? Can it be declared inside a function? Is it necessary for elements in a structure to have different sizes?

**Question 12:** What will be the output of the following codes:

#include<stdio.h>

#include<string.h>

int main( )

{

struct part {

char carname[20];

int carnumber;

};

struct part p, \*ptrp;

ptrp = &p;

strcpy(p.carname, "Mercedes");

p.carnumber = 102133;

printf("%s %d\n", p.carname, p.carnumber);

printf("%s %d\n", (\*ptrp).carname, (\*ptrp).carnumber);

printf("%s %d\n", ptrp->carname, ptrp->carnumber);

return 0;

}

#include<stdio.h>

struct randomStruct{

int number;

char message1[50];

char message2[50];

} m1 = {22, "This is Message 1",

"& this is Message 2" };

int main( )

{

struct randomStruct m2, m3;

m2 = m1;

m3 = m2;

printf("%d %s %s\n", m1.number, m2.message1, m3.message2);

return 0;

}

**Question 13:** Point out the errors [**if** any] from the following codes:

#include<stdio.h>

#include<string.h>

int main( ){

struct employee {

char name[30];

int age;

float salary;

};

struct employee e;

strcpy(e.name, "Shailesh");

age = 25;

salary = 15500.00;

printf("%s %d %f\n", e.name, age, salary);

return 0;

}

#include<stdio.h>

struct virus {

char name[20];

char type[30];

int serial;

} v[2] = { "Corona", "Deadly", 2019,

"HIV", "Killer", 1999 };

int main( )

{

int i;

for(i = 0; i<=1; i++)

printf("%s %s\n", v.name, v.type[]);

return 0;

}

**Question 14:** Create a structure named Student\_Info to store the name, ID number and CGPA of 30 students. All the inputs will be provided by the user. Now write a function probation\_Students() to print the names of all the students having CGPA less than 2.0.

**Question 15:** Write a C program to count the number of words and characters present in a file.

**Question 16:** What happens when you write into a file that already exists in the disk? What is the purpose of the fflush() library function?

**Question 17:** Answer the following:

1. While using the following statements in C file,

handlingfp = fopen ("myfile.txt", "r");

what happens if ‘myfile.txt’ does not exist on the disk and when ‘myfile.txt’ exists on the disk.

1. While using following the statement,

fp = fopen ("myfile.c", "wb");

what happens if ‘myfile.c’ does not exist on the disk and when ‘myfile.c’ exists on the disk.

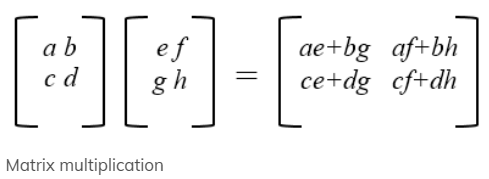
**Question 18:** Write a C program to print the elements of the following 2D array using a pointer.

{12,34,56,78,90},

{11,22,33,44,55},

{66,77,88,99,11}

**Question 19:** Write a C program to multiply two matrix using pointers.



**Question 20:** Point out the errors [**if** any] from the following code and [**if** there’s any error] explain how to fix them:

#include<stdio.h>

int main( )

{

int twoDimArr[3][] = {1, 2, 3,

4, 5, 6,

7, 8, 9};

printf("%d\n", twoDimArr[][]);

return 0;

}