SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE NAME : 23ITT101- PROBLEM SOLVING & C PROGRAMMING

I YEAR /I SEMESTER

Unit 4- Functions

Topic 6: Recursion

Brain Storming

1. How perform string manipulation operations?

Recursion in C

- Any function which calls itself is called recursive function, and such function calls are called recursive calls.
- Recursion involves several numbers of recursive calls.
- However, it is important to impose a termination condition of recursion.

Conti...

```c
#include <stdio.h>
int fact (int);
int main()
{
    int n,f;
    printf("Enter the number whose factorial you want to calculate?");
    scanf("%d",&n);
    f = fact(n);
    printf("factorial = %d",f);
}
int fact(int n)
{
    if (n==0)
    {
        return 0;
    }
    else if ( n == 1)
    {
        return 1;
    }
    else
    {
        return n*fact(n-1);
    }
}
```

Conti...

return 5 * factorial(4) = 120

└ return 4 * factorial(3) = 24

└ return 3 * factorial(2) = 6

└ return 2 * factorial(1) = 2

└ return 1 * factorial(0) = 1

1 * 2 * 3 * 4 * 5 = 120

C program for Sine Series

- *Sine Series* is a series which is used to find the value of Sin(x).
- where, **x** is the angle in **degree** which is converted to **Radian**.
- The formula used to express the Sin(x) as Sine Series is

$$\sin x = \sum_{x=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}$$

Conti....

Expanding the above notation, the formula of Sine Series is

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

For example,
Let the value of **x** be **30**.

$$x = 30 * \frac{\pi}{180} = 30 * \frac{3.14159}{180} = 0.52359$$

Conti…

So, Radian value for **30** degree is **0.52359.**

$$\sin(0.52359) = 0.52359 - \frac{0.52359^3}{3!} + \frac{0.52359^5}{5!} - \frac{0.52359^7}{7!} + \ldots\ldots$$

- So, Radian value for **30** degree is **0.52359.**

So, the value of **Sin(30)** is **0.5.**

Conti...

```
float sine(float an, int n)
{
   if (an == 0 || n == 0)
   return 0;
//to end the recursion when number of iterations are finished
   else
      return -1*pow(-1,n)*pow(an,2*n-1)/ factorial (2*n-1) + sine(an, n - 1);
}
//  `-1*pow(-1,n)` returns a negative term for even value of n, and postive term
   for odd value of n as required. You dont need separate if-else for that
```

Assessment 1

1. Write about recursive function?

Ans : _____

References

1. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016

Thank You