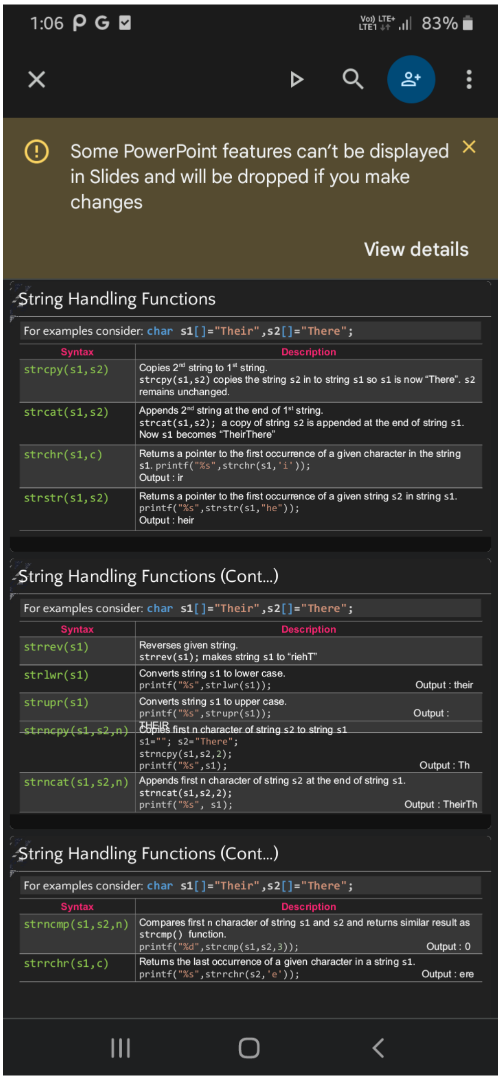
1)Enlist and explain various string handling functions.(strcat(), strlen(), strcpy(), strcmp() etc.)



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String Handling Functions

For examples consider: `char s1[]="Their",s2[]="There";`

Syntax	Description
`strcpy(s1,s2)`	Copies 2nd string to 1st string. `strcpy(s1,s2)` copies the string `s2` in to string `s1` so `s1` is now "There". `s2` remains unchanged.
`strcat(s1,s2)`	Appends 2nd string at the end of 1st string. `strcat(s1,s2);` a copy of string `s2` is appended at the end of string `s1`. Now `s1` becomes "TheirThere"
`strchr(s1,c)`	Returns a pointer to the first occurrence of a given character in the string `s1`. `printf("%s",strchr(s1,'i'));` Output : ir
`strstr(s1,s2)`	Returns a pointer to the first occurrence of a given string `s2` in string `s1`. `printf("%s",strstr(s1,"he"));` Output : heir

String Handling Functions (Cont...)

For examples consider: `char s1[]="Their",s2[]="There";`

Syntax	Description
`strrev(s1)`	Reverses given string. `strrev(s1);` makes string `s1` to "riehT"
`strlwr(s1)`	Converts string `s1` to lower case. `printf("%s",strlwr(s1));` Output : their
`strupr(s1)`	Converts string `s1` to upper case. `printf("%s",strupr(s1));` Output : THEIR

`strncpy(s1,s2,n)`	Copies first n character of string `s2` to string `s1`
	`s1=""; s2="There";`
	`strncpy(s1,s2,2);`
	`printf("%s",s1);` Output : Th

`strncat(s1,s2,n)`	Appends first n character of string `s2` at the end of string `s1`. `strncat(s1,s2,2);` `printf("%s", s1);` Output : TheirTh

String Handling Functions (Cont...)

For examples consider: `char s1[]="Their",s2[]="There";`

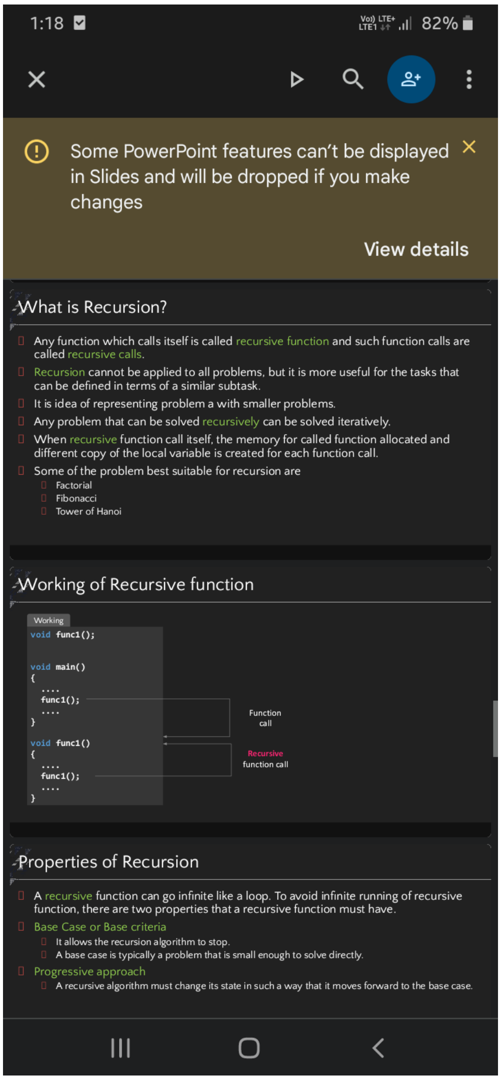
Syntax	Description
`strncmp(s1,s2,n)`	Compares first n character of string `s1` and `s2` and returns similar result as `strcmp()` function. `printf("%d",strcmp(s1,s2,3));` Output : 0
`strrchr(s1,c)`	Returns the last occurrence of a given character in a string `s1`. `printf("%s",strrchr(s2,'e'));` Output : ere

4)Describe the elements of the user defined function.

In C, a user-defined function typically consists of:

1. Return Type: Specifies the data type of the value the function returns, such as `int`, `float`, `void`, etc.
2. Function Name: The identifier for the function, following C's naming rules.
3. Parameters: Input values the function receives, enclosed in parentheses and separated by commas. Parameters are optional.
4. Function Body: The block of code enclosed in curly braces `{}` that defines the actions performed by the function.

5)Explain recursion with the help of an example.



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View details

What is Recursion?

- Any function which calls itself is called recursive function and such function calls are called recursive calls.
- Recursion cannot be applied to all problems, but it is more useful for the tasks that can be defined in terms of a similar subtask.
- It is idea of representing problem a with smaller problems.
- Any problem that can be solved recursively can be solved iteratively.
- When recursive function call itself, the memory for called function allocated and different copy of the local variable is created for each function call.
- Some of the problem best suitable for recursion are
  - Factorial
  - Fibonacci
  - Tower of Hanoi

Working of Recursive function

Working

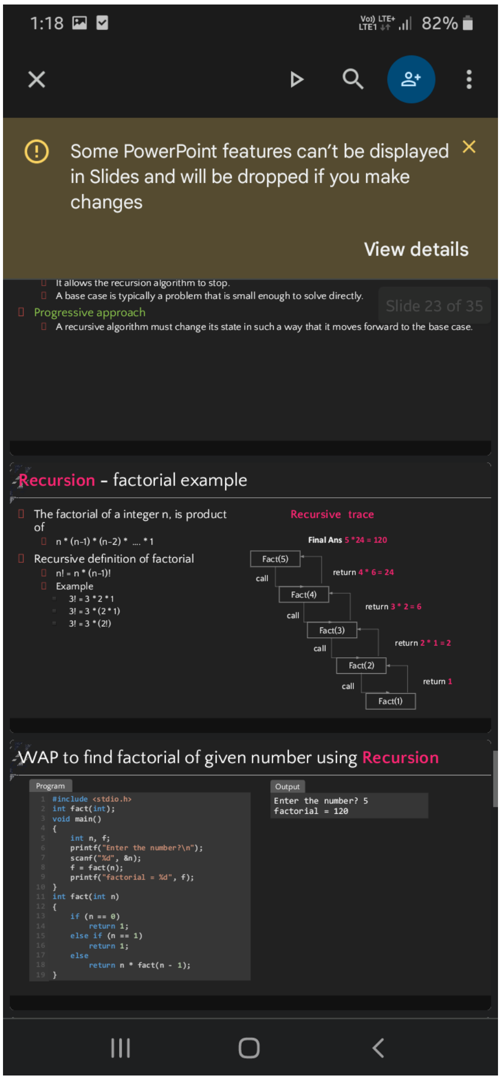
```
void func1();


void main()
{
  ....
  func1();
  ....
}

void func1()
{
  ....
  func1();
  ....
}
```

Function call

Recursive function call

Properties of Recursion

- A recursive function can go infinite like a loop. To avoid infinite running of recursive function, there are two properties that a recursive function must have.
- Base Case or Base criteria
  - It allows the recursion algorithm to stop.
  - A base case is typically a problem that is small enough to solve directly.
- Progressive approach
  - A recursive algorithm must change its state in such a way that it moves forward to the base case.



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- Progressive approach
    - A recursive algorithm must change its state in such a way that it moves forward to the base case.

Recursion – factorial example

- The factorial of a integer n, is product of
    - n * (n-1) * (n-2) * .... * 1
- Recursive definition of factorial
    - n! = n * (n-1)!
    - Example
        - 3! = 3 * 2 * 1
        - 3! = 3 * (2 * 1)
        - 3! = 3 * (2!)

Recursive trace

Final Ans 5 *24 = 120

Fact(5)

call

return 4 * 6 = 24

Fact(4)

call

return 3 * 2 = 6

Fact(3)

call

return 2 * 1 = 2

Fact(2)

call

return 1

Fact(1)

WAP to find factorial of given number using Recursion

Program

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

Output

```
Enter the number? 5
factorial = 120
```