

## WEEK-END ASSIGNMENT-08

### C Storage Classes & Recursion

#### Operating Systems Workshop (CSE 3541)

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#### Problem Statement:

Working with different storage classes and Experiment with one of the powerful tool, recursion, in problem solving and programming.

#### Assignment Objectives:

To learn about storage classes and get the idea of how function calls itself to solve computational problem.

#### Instruction to Students (If any):

**Students are required to write his/her own program by avoiding any kind of copy from any sources. Additionally, They must be able to realise the outcome of that question in relevant to systems programming.** You may use additional pages on requirement.

#### Programming/ Output Based Questions:

1. Consider the following ANSI C program;

```
#include <stdio.h>
int main()
{
    static int i=5;
    if(--i){
        main();
        printf("%d ",i);
    }
    return 0;
}
```

What is the output of the above program?

**Output with explanation**

2. Consider the following ANSI C program;

```
#include <stdio.h>
int a, b, c = 0;
void prtFun(void);
int main()
{ static int a = 1; /* Line 1 */
  prtFun( );
  a+=1;
  prtFun( );
  printf("\n %d %d ", a, b);
  return(0);
}

void prtFun(void)
{ static int a = 2; /* Line 2 */
  int b = 1;
  a + = ++b;
  printf(" \n %d %d ", a, b);
}
```

What is the output of the above program?

**Output with explanation**

3. Consider the following ANSI C program;

```
#include <stdio.h>
int a, b, c = 0;
void prtFun(void);
int main()
{ auto int a = 1; /* Line 1 */
  prtFun( );
  a+=1;
  prtFun( );
  printf("\n %d %d ", a, b);
  return(0);
}
void prtFun(void)
{ register int a = 2; /* Line 2 */
  int b = 1;
  a + = ++b;
  printf(" \n %d %d ", a, b);
}
```

What is the output of the above program?

**Output with explanation**

4. What is printed by the following ANSI C program?

[GATE 2005]

```
#include<stdio.h>
int f(int n, int k){
    if(n==0) return 0;
    else if(n%2) return f(n/2, 2*k)+k;
    else return f(n/2, 2*k)-k;
}
int main(){
    printf( "%d",f(20,1));
    return 0;
}
```

**Output with explanation**

5. What is printed by the following ANSI C program?

[GATE 2007]

```
#include<stdio.h>
void f(int n){
    if(n<=1){
        printf("%d",n);
    }
    else{
        f(n/2);
        printf("%d",n%2);
    }
}
int main()
{
    f(173);
    return 0;
}
```

**Output with explanation▼**

6. What is printed by the following ANSI C program?

[GATE 2011]

```
#include<stdio.h>
unsigned int foo(unsigned int n, unsigned int r)
{
    if(n>0) return ((n%r)+foo(n/r,r));
    else return 0;
}
int main()
{
    printf("%d\n", foo(345,10));
    return 0;
}
```

Output▼

7. What is printed by the following ANSI C program?

```
#include<stdio.h>
void print(int n)
{
    printf("Hello ");
    if(n++ == 0) return ;
    print(n);
    n++;
}

int main()
{
    print(-4);
}
```

Output▼

8. Consider the program below;

```
#include<stdio.h>
int foo(int a){
    if( a == 0 || a ==2) return 1;
    return (foo(--a) * (a--));
}
int main()
{
    printf("%d\n", foo(4));
}
```

Output▼

9. Consider the following C program

```
#include<stdio.h>
int main(){
    register int a =10;
    int *ptr = NULL;
    ptr = &a;
    *ptr = 5;
    printf("%d", *ptr);
    return(0);
}
```

Find the error in the program with proper reasoning

Output▼

10. Consider the following C function;

file1.c

```
-----  
extern in count;  
void write_extern() {  
    count +=2;  
}
```

file2.c

```
-----  
#include<stdio.h>  
#include "file1.c"  
int count = 5;  
int main() {  
    write_extern();  
    write_extern();  
    printf("%d\n", count);  
    return(0);  
}
```

Find the output if “file2.c” is compiled and executed:

Output with explanation▼

11. Write the output of the following program;

```
#include<stdio.h>  
int i=5;  
int main()  
{  
    extern int j;  
    printf("\ni=%d \nj=%d",i,j);  
    int j=10;  
    return 0;  
}  
  
int j =10;
```

Output▼

12. Find the output and different types of pointer involved in the code snippet;

```
#include <stdio.h>  
int fun(int num){  
    while(num>0)  
        num=num*fun(num-1);  
    return num;  
}  
int main(){  
    int x=fun(8);  
    printf("%d",x);  
    return 0;  
}
```

Output▼

13. Write a program to find the sum of an array elements using recursion.

**Program and Output▼**

14. Write a program to print “**n**” Fibonacci numbers using recursion.[N.B: The program format should be as follows]

```
#include <stdio.h>
... print_fibo(.....){
    ...
    ...
    ...
}
... main(){
    // get data from user
    print_fibo(...); // to print elements
}
```

#### Program and Output▼

15. Write a program to print the binary equivalent of a Decimal number using recursion.

**Program and Output▼**

16. Write a program to remove adjacent duplicate characters from a string using recursion.

**Program and Output▼**



17. Write a program to find the sum of a geometric sequence using recursion.

**Program and Output▼**

18. Write a recursive function that takes n words as input and print them in reverse order on separate lines. The prototype of the function should be as follows:

**void reverse\_input\_words(int n);**

**Program and Output▼**