

Subject : Programming in C

Chapter : Functions & storage classes

Topic : Recursion-I

DPP-03

[NAT]

1. Consider the following function:

```
int f(int n)
{
    if(n<2) return n;
    return f(n/3)+3;
}
```

The value returned by f(27) is _____

[MCQ]

2. Consider the following program:

```
#include<stdio.h>
static int i;
extern int i=3;
void f(int n)
{
    if(n)
    {
        printf("%d\t", i++);
        f(n-1);
    }
}
int main()
{
    f(4);
    return 0;
}
```

The output is:

- (a) 3 4 5 6 7
 (b) 3 4 5 6
 (c) 0 1 2 3
 (d) Compilation error.

[NAT]

3. Consider the following function:

```
void f(int n){
    static int i=3;
    if(n%2){
        n+=i--;
        printf("%d\t", n);
        f(n-1);
    }
}
```

```
}
    n++;
    printf("%d\t", n);
}
```

The sum of the values printed when f(5) is called is _____

[NAT]

4. Consider the following function:

```
int func(int a, int b)
{
    if (a<b)
        return a+b;
    else
        return 1+func(a-1, b+1);
}
```

The value returned by func(4, 2) is _____.

[MCQ]

5. Consider the following function:

```
void arc(int n){
    if (n<=2) return;
    else{
        arc(n-2);
        printf("%d\t", n-1);
        arc(n-3);
        printf("%d\t", n-2);
    }
}
```

The output printed when arc(7) is called-

- (a) 6 2 1 4 3 3 2 5
 (b) 2 3 4 1 2 3 6 5
 (c) 2 1 4 3 6 3 2 5
 (d) 5 2 3 6 3 4 2 1

[MCQ]

```

6. #include<stdio.h>
void print(int n)
{
printf("GATE Wallah\n");
    if(n++==0) return;
    print(n++);
}
int main()
{
    void print();
    void print();
    print(-4);
    return 0;
}

```

Which of the following is correct?

- (a) Compilation error
- (b) "GATE Wallah" will be printed infinite number of times.
- (c) "GATE Wallah" will be printed 4 times.
- (d) "GATE Wallah" will be printed 5 times.

[MCQ]

7. Consider the following program:

```

void arc()
{
    int a;
    static int b;
    a=b;
    printf("%d\t%d\t", a++, b++);
    if(a<=3)
        arc();
}

```

When arc() is called from main, the output is:

- (a) 00112233
- (b) 11223344
- (c) 01122334
- (d) 12233445

[NAT]

8. Consider the following function:

```

int arc(int i, int j)
{
    if(i<2) return j+2;
    else if(j<2) return arc(i-1, 1);
    else return arc(i-1, arc(i, j-2));
}

```

The value returned by arc(2, 6) is _____

Answer Key

- | | |
|---------|--------|
| 1. (10) | 5. (c) |
| 2. (b) | 6. (d) |
| 3. (45) | 7. (a) |
| 4. (8) | 8. (9) |



Hints and Solutions

1. (10)

f(27):

if(n<2) return n; //27<2->FALSE

return f(n/3)+3; //f(9) is called;

//f(27) returns (7+3) i.e 10

f(9):

if(n<2) return n; //9<2->FALSE

return f(n/3)+3; //f(3) is called;

//f(9) returns (4+3) i.e 7 to f(27)

f(3):

if(n<2) return n; //3<2->FALSE

return f(n/3)+3; //f(1) is called; f(1) returns 1.

//f(3) returns (1+3) i.e 4 to f(9)

2. (b)

extern int i=3; //No compilation error. Assigns 3 to global static variable i.

f(4):

if(4){//true

printf("%d\t", i++); //3 is printed. Global static i is incremented to 4.

f(n-1); //f(3) is called

}

f(3):

if(3){//true

printf("%d\t", i++); //4 is printed. Global static i is incremented to 5.

f(n-1); //f(2) is called

}

f(2):

if(2){//true

printf("%d\t", i++); //5 is printed. Global static i is

incremented to 6.

f(n-1); //f(1) is called

}

f(1):

if(1){//true

printf("%d\t", i++); //6 is printed. Global static i is incremented to 7.

f(n-1); //f(0) is called. It does nothing.

}

Output: 3 4 5 6

3. (45)

4. (8)

func(4, 2):

4<2 -> FALSE

return 1+func(3, 3); // return (1+7) i.e return 8

func(3, 3):

3<3 -> FALSE

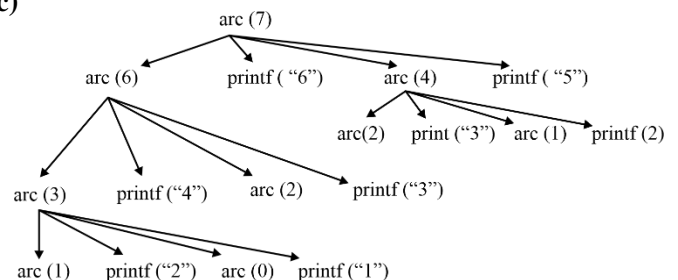
return 1+func(2, 4); // return (1+6) i.e return 7

func(2, 4):

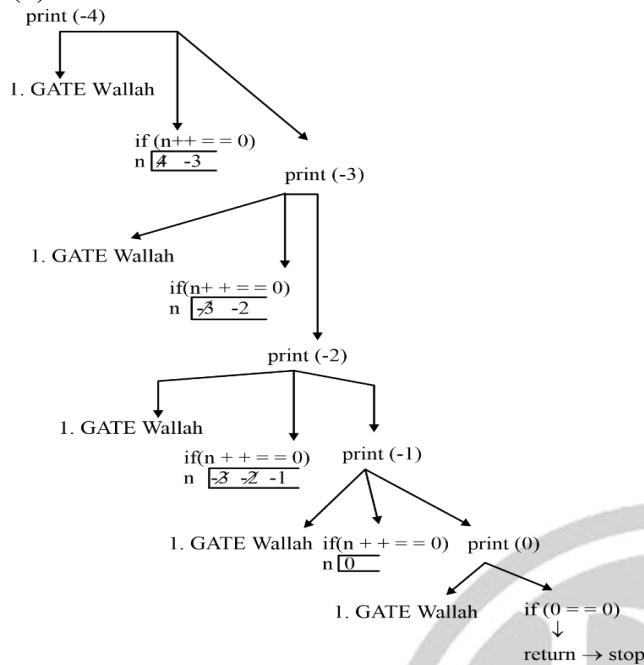
2<4 -> TRUE

return (2+4); // return 6

5. (c)



6. (d)



“GATE Wallah” is printed 5 times.

7. (a)

arc():

```

int a;
static int b; // static variable b is by default initialized to 0
a=b; // a contains 0
printf("%d\t%d\t", a++, b++); // 0 0 is printed. a is incremented to 1, b is incremented to 1.
if(a<=3) // 1<=3-> True
arc(); // arc() is called.

```

arc();

```

int a;
static int b; // static variable b contains 1.
a=b; // a contains 1
printf("%d\t%d\t", a++, b++); // 1 1 is printed. a is incremented to 2, b is incremented to 2.
if(a<=3) // 2<=3-> True
arc(); // arc() is called.

```

arc():

```

int a;
static int b; // static variable b contains 2.
a=b; // a contains 2
printf("%d\t%d\t", a++, b++); // 2 2 is printed. a is incremented to 3, b is incremented to 3.
if(a<=3) // 3<=3-> True
arc(); // arc() is called.

```

arc():

```

int a;
static int b; // static variable b contains 3.
a=b; // a contains 3.
printf("%d\t%d\t", a++, b++); // 3 3 is printed. a is incremented to 4, b is incremented to 4.
if(a<=3) // 4<=3-> False; execution stops.

```

8. (9)

arc(2, 6):

1: return arc(1, arc(2, 4)); // arc(2, 4) returns 7

7: return arc(1, 7); // return (7+2) i.e 9

arc(2, 4):

2: return arc(1, arc(2, 2)); // arc(2, 2) returns 5 to arc(2, 4)

6: return arc(1, 4); // arc(1, 4) returns 7.

arc(2, 2):

3: return arc(1, arc(2, 0));

// arc(2, 0) returns 3 to arc(2, 2)

5: return arc(1, 2); // arc(1, 2) returns 5

arc(2, 0):

4: return arc(1, 1); // arc(1, 1) returns (1+2) i.e 3 to arc(2, 0)



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