Branch : CSE & IT Batch : Hinglish

WEEKLY TEST – 03

Subject : Programming in C

Topic : Functions and Storage Classes

Maximum Marks 20

Q.1 to 6 Carry ONE Mark Each

[MCQ]

1. Consider the following program:

```
#include<stdio.h>
int func(int i){
   i-=3;
   return i;
}
void main(){
   int i=printf("Parakram 2024");
   i=func(i=func(i=func(--i)));
   printf("%d", i);
}
```

The output is-

(a) Parakram 20243
(b) Parakram 20246
(c) Parakram 20249
(d) Parakram 2024

[MCQ]

2. Consider the following program:

```
#include<stdio.h>
int a=5;
extern int a;
void main(){
   for(;--a>0;a--)
   printf("GATE Wallah");
}
```

The output is:

(a) "GATE Wallah" is printed 4 times.
(b) "GATE Wallah" is printed 2 times.
(c) "GATE Wallah" is printed 5 times.
(d) Compilation error.

[MSQ]

3. Which of the following statements is/are CORRECT?

(a) A static variable has internal linkage.
(b) Default value of register variable is garbage.
(c) Default value of global variable is garbage.
(d) An extern variable can be declared multiple times in a program.

[MCQ]

4. Consider the following two statements:

```
P: int a=2;
   static int b=a;
Q: static int j;
    static int j=1;
```

Which of the following statements is/are INCORRECT?

(a) Neither P nor Q
(b) P only
(c) Q only
(d) Both P and Q.

[MCQ]

5.

```
#include<stdio.h>
void arc(int n){
   if (n<=2) return;
   else{
      arc(n-2);
      printf("%d\t", n-1);
   }
}
int main(){
        arc(9);
        return 0;
}
```

The output printed is-

(a) 2 4 6 8 (b) 4 6 8 10
(c) 8 6 4 2 (d) 7 9 11 13

[MCQ]

6.
```
#include<stdio.h>
int main(){
  int p=3;
  {
     int p=6;
      printf("%d\t", --p);
  }
       {
          printf("%d\t",--p);
int p=7; {p--;}
printf("%d\t", p--);
       }
printf("%d", --p);
  return 0;
}
```
The output printed is-

(a) 1 6 2 5 (b) 5 10 6 2

(c) 5 2 6 1 (d) 5 6 1 10

Q.7 to 13 Carry TWO Mark Each

[NAT]

7.
```
int func(int a){
   static int i=3;
   if(a<4) return a+i++;
   a=a-i--;
   return func(a)+i;
}
```
What is the value returned by func(9)? _____

[NAT]

8.
```
int func(int a, int b){
   static int p, q=1;
   if(a>=b){
      a=a-++p;
      b=b+--q;
      return func(a,b)+p;
   }else return p-q;
}
```
The value returned by func(4, 3) is _____.

[MCQ]

9.
```
#include<stdio.h>
int func(int a){
   static int x=2;
   if(a>7) return a;
   a=a+x;
   x++;
   return func(a);
}
```
The value returned by func(1) is-

(a) 7 (b) 8

(c) 10 (d) 12

[NAT]

10.
```
#include<stdio.h>
int func(int n){
   int i, j=1;
   if(n<1) return j;
   for(i=2;i<n;i*=2)
   j+=func(i)+func(n-i);
   return j;
}
```
The value returned by func(5) is _____

[NAT]

11. Consider the following program:
```
#include<stdio.h>
void func(int a){
   static int i=7;
   if(a<=1) return;
   printf("%d\t",i--);
   a=a-i--;
   printf("%d\t",a);
   func(a-2);
   printf("%d\t",i++);
}
```

```
int main(){
   func(10);
   return 0;
}
```

The sum of the values printed is_____

[MSQ]

12.

```
int func(int k){
   static int i=10;
   int j;
   if(i==k){
      printf("Pankaj Sharma");
      j=func(i);
      return 0;
   }
   return 0;
}
```

Which of the following statement(s) is/are CORRECT?

(a) The function returns 0 for all values of k.

(b) The function doesn't print "Pankaj Sharma" for all values of k.

(c) The functions prints "Pankaj Sharma" infinitely or gives stack overflow error when k=10.

(d) The function returns 0 if k=10;

[MCQ]

13.

```
int func(int a, int b){
   if(a>0)
      return a%b + func(a/b, b/4);
      else return 0;
   }
```

The value returned by func(347, 32) is-

(a) 12 (b) 30

(c) 18 (d) 10

Answer Key

1. **(a)**
2. **(b)**
3. **(a, b, d)**
4. **(d)**
5. **(a)**
6. **(c)**
7. **(6)**
8. **(7)**
9. **(c)**
10. **(9)**
11. **(21)**
12. **(b, c)**
13. **(b)**

Hints and Solutions

1. (a)

```
void main(){
   int i=printf("Parakram 2024");//i=13
   i=func(i=func(i=func(--i)));
  //func(--i) i.e func(12) returns 9.
   //func(i=9) i.e func(9) returns 6.
  //func(i=6) i.e func(6) returns 3.
   printf("%d", i);//3
}
```

Output: Parakram 20243

2. (b)

```
#include<stdio.h>
int a=5;
extern int a;//It will not give any compilation error.
void main(){
   for(;--a>0;a--)//the loop executes two times.
   printf("GATE Wallah");
}
```

"GATE Wallah" is printed 2 times.

3. (a, b, d)

(a) CORRECT. A static variable has internal linkage.

(b) CORRECT. Default value of register variable is garbage.

(c) INCORRECT. Default value of global variable is zero.

(d) CORRECT. An extern variable can be declared multiple times in a program.

4. (d)

P is not allowed. We can initialize a static variable with a constant only.

Q is not allowed if the static variable j has local scope.

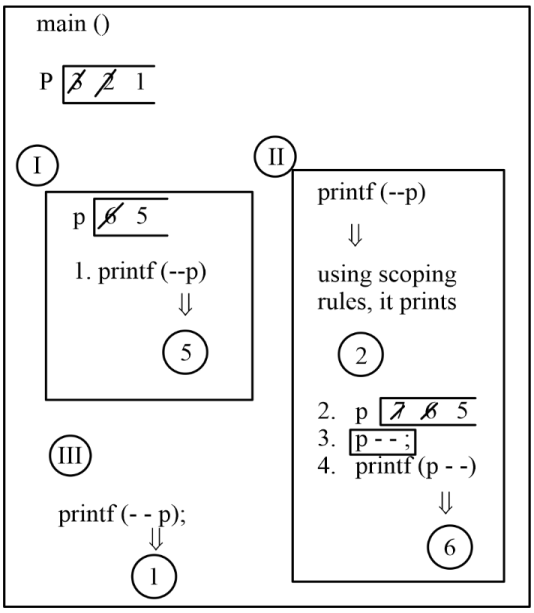
5. (a)

arc(9) n | 9   1. if (n < = 2) → false   2. arc(9 – 2);   3. printf("8");
arc(7) n | 7   1. if (n < = 2) → false   2. arc(5)   3. printf("6");
arc(5) n | 5   1. if (n < = 2) → false   2. arc(3)   3. printf("4");
arc(3) n | 3   1. if (n < = 2) → false   2. arc(1)   3. printf("2");
arc(1) n | 1   1. return

Output:

2 4 6 8

6. (c)



Output is: 5 2 6 1

7. (6)

```
int func(int a){
   static int i=3;
   if(a<4) return a+i++;//line 1
   a=a-i--;//line 2
   return func(a)+i;//line 3
}
```

func(9):
Line1: 9<4 → FALSE
Line2: a=a-i--; a=9-3=6; static i is decremented to 2.
Line3: Call func(6);
return (5+1);//return 6

func(6):
Line1: 6<4 → FALSE
Line2: a=a-i--; a=6-2=4; static i is decremented to 1.
Line3: Call func(4);
return (4+1);//return 5 to func(9)

func(4):
Line1: 4<4 → FALSE
Line2: a=a-i--; a=4-1=3; static i is decremented to 0.
Line3: Call func(3);
return (3+1);//return 4 to func(6)

func(3):
Line1: 3<4 → TRUE; return a+i++;
//return (3+0) to func(4) then static i is incremented to 1.

8. (7)

```
int func(int a, int b){
   static int p, q=1;
   if(a>=b){ //Line 1
      a=a-++p;//Line 2
      b=b+--q;//Line 3
      return func(a,b)+p;//Line 4
   }else return p-q;//Line 5
}
```

func(4, 3)://a=4, b=3
Line1: 4>=3 → TRUE
Line2: a=a-++p; //a=4-1=3;
Line3: b=b+--q;//b=3+0=3;
Line4: return func(3, 3)+2; // **return 5+2 i.e 7**

func(3, 3)://a=3, b=3
Line1: 3>=3 → TRUE
Line2: a=a-++p; //a=3-2=1;
Line3: b=b+--q;//b=3-1=2;.
Line4: return func(1,2)+2; // return 3+2 i.e 5

func(1, 2):
Line1: 1>=2 → FALSE
Line5: return p-q; // return 2+1 i.e return 3.

9. (c)

func(1):

```
   static int x=2;
   if(a>7) return a;//1>7 is FALSE
   a=a+x; //a=1+2=3
   x++;//static x is incremented to 3.
   return func(a);// func(3) is called.
```

func(3):

```
   if(a>7) return a;//3>7 is FALSE
   a=a+x; //a=3+3=6
   x++;//static x is incremented to 4.
   return func(a);// func(6) is called.
```

func(6):

```
   if(a>7) return a;//6>7 is FALSE
   a=a+x; //a=6+4=10
   x++;//static x is incremented to 5.
   return func(a);// func(10) is called.
```

func(10):
if(a>7) return a;//10>7 is TRUE, so, **10 is returned.**
Output: 10

10. (9)

func(5):
n=5; j=1;
if(n<1) return j; //5<1 is FALSE
for i=2:
j+=func(i)+func(n-i);//j=j+func(2)+func(3);
func(2) returns 1, func(3) returns 3.So, j=1+1+3=5
for i=4:
j+=func(i)+func(n-i);//j=j+func(4)+func(1);
func(1) returns 1, func(4) returns 3.So, j=5+3+1=9
return j; //**return 9;**

11. (21)

func(8):

if(a<=1) return; //8<=1: FALSE

1. printf("%d\t",i--);//7 is printed, static i is decremented to 6.

a=a-i--;//a=10-6=4; static i is decremented to 5.

2. printf("%d\t",a);//4 is printed.

func(a-2);//func(2) is called.

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

func(2):

if(a<=1) return; //2<=1: FALSE

3. printf("%d\t",i--);//5 is printed, static i is decremented to 4.

a=a-i--;//a=2-4=-2; static i is decremented to 3.

4. printf("%d\t",a);//-2 is printed.

func(a-2);//func(0) is called. It simply returns.

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

Output: 7 4 5 -2 3 4

Sum: 21

12. (b, c)

When k!=10, then the functions returns 0. So, (a, d) are INCORRECT.

The function prints "Pankaj Sharma" for k=10. So, b is correct.

The function prints "Pankaj Sharma" for k=10 infinite times or until runtime stack overflows. So, (c) is correct.

13. (b)

func(347, 32): //a=347, b=32

if(a>0) //347>0 → TRUE

return a%b + func(a/b, b/4);//func(10, 8) is called. So, 27+3 i.e **30 is returned**

func(10, 8): //a=10, b=8

if(a>0) //10>0 → TRUE

return a%b + func(a/b, b/4);//func(1, 2) is called. So, 2+1 is returned

func(1, 2): //a=1, b=2

if(a>0) //1>0 → TRUE

return a%b + func(a/b, b/4);//func(0, 0) is called. So, 1+0 is returned.

func(0, 0) returns 0;