1- Topic:- Recursion

Consider the following program written in pseudo-code. Assume that x and y are integers.

```
Count (x, y) {
   if (y !=1 ) {
      if (x !=1) {
         print("*");
         Count (x/2, y);
      }
      else {
         y=y-1;
         Count (1024, y);
      }
   }
}
```

The number of times that the print statement is executed by the call Count(1024, 1024) is _____ .

Answer: 10230

Solution

2- Topic:- Recursion

Consider the following C program:

```
#include <stdio.h>


int counter = 0;


int calc(int a, int b) {

int c;
```

```
counter++;
if (b == 3)
return (a * a * a);
else {
c = calc(a, b / 3);
return (c * c * c);
}
}

int main() {
calc(4, 81);
printf("%d", counter);
}
```

The output of this program is _____ .

Answer: 4

Solution

3- Topic:- Structure

Consider the following C program.

```
#include <stdio.h>
struct Ournode {
char x, y, z;
};

int main() {
```

```
struct Ournode p = {'1', '0', 'a' + 2};

struct Ournode *q = &p;

printf("%c, %c", *((char *)q + 1), *((char *)q + 2));

return 0;

}
```

The output of this program is:

(A) 0, c
(B) 0, a+2
(C) ‘0’, ‘a+2’
(D) ‘0’, ‘c’

Option: A

Solution

4- Topic:- Double Pointer

Consider the following C program:

```
#include <stdio.h>

void fun1(char *s1, char *s2) {

char *temp;

temp = s1;

s1 = s2;

s2 = temp;

}

void fun2(char **s1, char **s2) {

char *temp;

temp = *s1;
```

```
*s1 = *s2;
*s2 = temp;
}
int main() {
char *str1 = "Hi", *str2 = "Bye";
fun1(str1, str2);
printf("%s %s", str1, str2);
fun2(&str1, &str2);
printf("%s %s", str1, str2);
return 0;
}
```

The output of the program above is

(A) Hi Bye Bye Hi
(B) Hi Bye Hi Bye
(C) Bye Hi Hi Bye
(D) Bye Hi Bye Hi

Option: A

Solution

5- Topic:- Recursion

Consider the following two functions

```
void fun1(int n){
    if(n == 0) return;
    printf(“%d”, n);
    fun2(n-2);
    printf(“%d”, n);
```

```
}

void fun2(int n){

    if(n == 0) return;
    printf("%d", n);
    fun1(++n);
    printf("%d", n);
}
```

The output printed when fun1 (5) is called is
(A) 53423122233445
(B) 53423120112233
(C) 53423122132435
(D) 53423120213243

Option: A

Solution

6- Topic:- Bit Operation

The output of executing the following C program is _____.

```
# include

int total(int v)
{
  static int count = 0;
  while (v) {
    count += v & 1;
    v >>= 1;
  }
  return count;
}

void main()
{
  static int x = 0;
  int i = 5;
```

```
  for (; i> 0; i--) {
     x = x + total(i);
  }
  printf (“%d\n”, x) ;
}
```

(A) 23
(B) 24
(C) 26
(D) 27

Option: A

Solution

7- Topic:- Recursion

Consider the C functions **foo** and **bar** given below:

```
int foo(int val)
{
   int x = 0;
   while (val > 0)
   {
      x = x + foo(val--);
   }
   return val;
}

int bar(int val)
{
   int x = 0;
   while (val > 0)
   {
      x = x + bar(val-1);
   }
   return val;
```

```
}
```

Invocations of foo(3) and bar(3) will result in:

(A) Return of 6 and 6 respectively
(B) Infinite loop and abnormal termination respectively
(C) Abnormal termination and infinite loop respectively
(D) Both terminating abnormally

Option: C

Solution

8- Topic:- Signed VS Unsigned

Consider the following C program.

```
#include <stdio.h>
#include <string.h>

void printlength (char *s, char *t)
{
  unsigned int c = 0;
  int len = ((strlen (s) - strlen (t)) > c) ? strlen (s) : strlen (t);
  printf("%d\n", len);
}

void main()
{
  char *x = "abc";
  char *y = "defgh";
  printlength(x, y);
}
```

Recall that strlen is defined in string.h as returning a value of type size_t, which is an unsigned int

.
The output of the program is _____.

Answer: 3

Solution

9- Topic:- Pointer

Consider the following function implemented in C:

```
void printxy(int x, int y)
{
   int *ptr;
   x = 0;
   ptr = &x;
   y = *ptr;
   *ptr = 1;
   printf("%d,%d", x, y);
}
```

The output of the printxy(1,1) is
(A) 0,0
(B) 0,1
(C) 1,0
(D) 1,1

Option: C

Solution

10- Topic:- Conditions

Consider the C program fragment below which is meant to divide x by y using repeated subtractions. The variable x, y, q and r are all unsigned int.

```
while(r >= y)
{
r = r - y;
q = q + 1;
}
```

Which of the following conditions on the variables x, y, q and r before the execution of the fragment will ensure that the loop terminates in a state satisfying the condition x == (y*q + r)?
(A) (q == r) && (r == 0)
(B) (x > 0) && (r == x) && (y > 0)
(C) (q == 0) && (r == x) && (y > 0)
(D) (q == 0) && (y > 0)

Option: C

Solution

11- Topic:- Array

Consider the following snippet of a C program. Assume that swap(&x, &y) exchanges the contents of x and y.

```
int main()
{
   int array[] = {3, 5, 1, 4, 6, 2};
   int done = 0;
   int i;

   while (done == 0)
   {
      done  = 1;
      for (i = 0; i <= 4; i++)
      {
         if (array[i] = 1; i--)
      {
         if (array[i] > array[i-1])
         {
```

```
            swap(&array[i], &array[i-1]);
            done = 0;
          }
        }
    }

    printf("%d", array[3]);
}
```

The output of the program is _____.

Answer: 3

Solution

12- Topic:- Output

Consider the following C program:

```
#include
int main()
{
    int m = 10;
    int n, n1;
    n = ++m;
    n1 = m++;
    n--;
    --n1;
    n -= n1;
    printf("%d",n);
    return 0;
}
```

The output of the program is _____.

Answer: 0

Solution

13- Topic:- Pointer to String

Consider the following program

```
#include<stdio.h>
#include<string.h>

int main()
{
   char * c = "GATECSIT2017";
   char *p = c;
   printf("%d", (int)strlen(c+2[p]-6[p]-1));
   return 0;
}
```

The Output of the following program is_____.

Answer: 2

Solution

14- Topic:- Type Checking

Consider the following C program.

```
void f(int, short);

void main()

{

int i = 100;

short s = 12;

short *p = &s;
```

_____ ; // call to f()

}

Which one of the following expressions, when placed in the blank above, will NOT result in a type checking error?

(A) f(s, *s)

(B) i = f(i,s)
(C) f(i,*s)
(D) f(i,*p)

Option: D

Solution

15- Topic:- Call by Reference

Consider the following C program.

```
#include<stdio.h>

void mystery(int *ptra, int *ptrb)

{

int *temp;

temp = ptrb;

ptrb = ptra;

ptra = temp;

}

int main()

{

int a=2016, b=0, c=4, d=42;

mystery(&a, &b);
```

```
if (a < c)
mystery(&c, &a);
mystery(&a, &d);
printf(\"%d", a);
}
```

The output of the program _____.

Answer: 2016

Solution

16- Topic:- Conditions

The following function computes X^Y for positive integers X and Y.

```
int exp(int X, int Y)
{
int res = 1, a = X, b = Y;
while ( b != 0 )
{
if ( b%2 == 0)
{
a = a*a;
b = b/2;
}
else
{
res = res*a;
```

b = b-1;

}

}

return res;

}

Which one of the following conditions is TRUE before every iteration of the loop.

A. $X^Y = a^b$
B. $(res * a)^Y = (res * X)^b$
C. $X^Y = res * a^b$
D. $X^Y = (res * a)^b$

Option: C

Solution

17- Topic:- Recursion

What will be the output of the following C program?

```
void count (int n) {
   static int d=1;

   printf ("%d",n);
   printf ("%d",d);
   d++;
   if (n>1) count (n-1);
   printf ("%d",d);


}

void main(){
   count (3);
}
```

(A) 3 1 2 2 1 3 4 4 4

(B) 3 1 2 1 1 1 2 2 2

(C) 3 1 2 2 1 3 4

(D) 3 1 2 1 1 1 2

Option: A

Solution

18- Topic:- Pointer

The value printed by the following program is

```
void f(int* p, int m)
{
m = m + 5;
*p = *p + m;
return;
}
void main()
{
int i=5, j=10;
f(&i, j);
printf(\"%d\", i+j);
}
```

(A) 10
(B) 20
(C) 30
(D) 40

Option: C

Solution

19- Topic:- Recursion

Consider the following program:

```
int f(int *p, int n)
{
if (n <= 1) return 0;
else return max(f(p+1,n-1),p[0]-p[1]);
}
int main()
{
int a[] = {3,5,2,6,4};
printf("%d", f(a,5));
}
```

Note: max(x,y) returns the maximum of x and y. The value printed by this program is

(A) 2
(B) 3
(C) 4
(D) 5

Option: B

Solution

20- Topic:- Conditions

Consider the following pseudo code, where x and y are positive integers.

```
begin
  q := 0
  r := x
while r >= y do
  begin
    r := r – y
    q := q + 1
  end
end
```

The post condition that needs to be satisfied after the program terminates is
(A) {r = qx + y ∧ r < y}
(B) {x = qy + r ∧ r < y}
(C) {y = qx + r ∧ 0 < r < y}
(D) { q + 1 0}

Option: B

Solution

21- Topic:- Recursion

Consider the following function written in the C programming language.

The output of the above function on input “ABCD EFGH” is

```
void foo (char *a)
{
if (*a && *a != ` `)
{
foo(a+1);
putchar(*a);
}
}
```

(A) ABCD EFGH
(B) ABCD
(C) HGFE DCBA
(D) DCBA

Option: D

Solution

22- Topic:- Matrix in Memory

What is the output of the following C code? Assume that the address of x is 2000 (in decimal) and an integer requires four bytes of memory.

```
#include <stdio.h>

int main()

{

unsigned int x[4][3] = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}, {10, 11, 12}};


printf("%u, %u, %u", x+3, *(x+3), *(x+2)+3);

}
```

(A) 2036, 2036, 2036
(B) 2012, 4, 2204
(C) 2036, 10, 10
(D) 2012, 4, 6

Option: A

Solution

23- Topic:- Call by Reference

The output of the following C program is _____.

```
void f1 (int a, int b)
{
int c;
c=a; a=b; b=c;
}
void f2 (int *a, int *b)
{
int c;
c=*a; *a=*b;*b=c;
}
int main()
{
int a=4, b=5, c=6;
f1(a, b);
f2(&b, &c);
printf (“%d”, c-a-b);
return 0;
}
```

(A) -5
(B) 6
(C) 7
(D) 8

Option: A

Solution

24- Topic:- Recursion

Consider the following C function.

```
int fun (int n)
{
int x=1, k;
if (n==1) return x;
for (k=1; k < n; ++k)
x = x + fun(k) * fun(n – k);
return x;
}
```

The return value of fun(5) is _____.

(A) 0
(B) 26
(C) 51
(D) 71

Option: C

Solution

25- Topic:- Switch Case

Consider the following C program:

```
# include <stdio.h>
int main( )
{
```

```
int i, j, k = 0;
j = 2 * 3 / 4 + 2.0 / 5 + 8 / 5;
k -= --j;
for (i = 0; i < 5; i++)
{
switch(i + k)
{
case 1:
case 2: printf("\n%d", i + k);
case 3: printf("\n%d", i + k);
default: printf("\n%d", i + k);
}
}
return 0;
}
```

The number of times printf statement is executed is _____.

(A) 8
(B) 9
(C) 10
(D) 11

Option: C

Solution

26- Topic:- Pointer

Consider the following C program.

```
# include

int main( )

{

static int a[] = {10, 20, 30, 40, 50};

static int *p[] = {a, a+3, a+4, a+1, a+2};

int **ptr = p;

ptr++;

printf("%d%d", ptr - p, **ptr};

}
```

The output of the program is _____

(A) 140
(B) 120
(C) 100
(D) 40

Option: A

Solution

27- Topic:- Recursion

Consider the following recursive JAVA function. If get(6) function is being called in main() then how many times will the get() function be invoked before returning to the main()?

```
static void get (int n)
{
  if (n < 1) return;
  get(n-1);
  get(n-3);
  System.out.print(n);
}
```

(A) 15

(B) 25

(C) 35

(D) 45

Option: B

Solution

28- Topic:- Output

Consider the following C program.
The output of the program is _____.

```
# include <stdio.h>

int f1(void);

int f2(void);

int f3(void);

int x = 10;

int main()

{

int x = 1;

x += f1() + f2() + f3() + f2();

pirntf("%d", x);

return 0;

}


int f1()

{

int x = 25;
```

```
x++;
return x;
}

int f2( )
{
static int x = 50;
x++;
return x;
}

int f3( )
{
x *= 10;
return x;
}
```

(A) 230
(B) 131
(C) 231
(D) 330

Option: A

Solution

29- Topic:- Character Array

Consider the following C program segment.

```
# include <stdio.h>
```

```
int main( )
{
char s1[7] = \"1234\", *p;
p = s1 + 2;
*p = \'0\' ;
printf (\"%s\", s1);
}
```

What will be printed by the program?

(A) 12

(B) 120400

(C) 1204

(D) 1034

Option: C

Solution

30- Topic:- Output

Consider the following program in C language:

```
#include <stdio.h>
main()
{
int i;
int *pi = &i;
scanf("%d", pi);
printf("%d\n", i+5);
}
```

Which one of the following statements is TRUE?

(A) Compilation fails.
(B) Execution results in a run-time error.
(C) On execution, the value printed is 5 more than the address of variable i.
(D) On execution, the value printed is 5 more than the integer value entered.

Option: D

Solution