GATE QUESTIONS(PROGRAMMING)

Q.1 The value of j at the end of the execution of the following C program

```
int incr (int i){
        static int count = 0;
        count = count + i;
        return (count);
}
        main () {
        int i, j;
        for (i = 0; i <=4; i++)
        j= incr (i);
}
```

is

a) 10 b) 4
c) 6 d) 7

[GATE -2000]

Q.2 The most approximate matching for the following pairs

List-I
X: m = malloc (5); m = NULL;
Y: free (n); n->value =5;
Z: char *p; *p= 'a';

List-II
1: using dangling pointers
2: using uninitialized pointers
3: lost memory

Codes:
a) X—1, Y— 3, Z— 2
b) X— 2, Y — 1, Z—3
c) X— 3, Y— 2, Z—1
d) X — 3, Y— 1, Z —2

[GATE- 2000]

Q.3 The following C declarations

```
struct node {
        int i:
        float j;
};
        struct node * s[10];
```

Define s to be -

a) An array, each element of which is a pointer to a structure of type node
b) A structure of 2 fields, each field being a pointer to an array of 10 elements
c) A structure of 3 fields: an integer, a float, and an array of 10 elements
d)An array, each element of which is a structure of type node

[GATE -2000]

Q.4 What is printed by the print statements in the program P1 assuming call by reference parameter passing?

```
Program P1 ( ) {
        x = 10;
        y = 3;
        func1 (y, x, x);
        print  x;
        print  y;
}
func1 (x, y, z) {
        y =y+4;
        z = x + y +z;
}
```

a) 10, 3 b) 31, 3
c) 27, 7 d) None of these

[GATE -2001]

Q.5 In the C language

a) At most one activation record exists between the current activation record and the activation record for the main
b) The number of activation records between the current activation record and the activation record for the main depends on the actual function calling sequence
c) The visibility of global variables depends on the actual function calling sequence
d) Recursion requires the activation record for the recursive function to be saved on

a different stack before the recursive function can be cal led
[GATE -2002]

Q.6 The results returned by function under value-result and reference parameter passing conventions
a) Do not differ
b) Differ in the presence of loops
c) Differ in all cases
d) May differ in the presence of exception
[GATE- 2002]

Q.7 Assume the following C variable declaration
int * A[10], B[10][10];
Of the following expressions which will not give compile time errors if used as left hand sides of assignment statements in a C program?
I. A [2]
II. A[2][3]
III. B[1]
IV. B [2][3]
a) I, II, and IV only
b) II, III, and IV only
c) II and IV only
d) IV only
[GATE- 2003]

Q.8 Consider the C program shown below:
```
# include <stdio.h>
# define print(x) printf ("%d", x)
int x;
void Q(int z); {
        z +=x;
        print (z);
}
void P(int *y) {
        int x= *y+2;
        Q(x);
        *y = x-1;
        print (x);
}
main (void) {
        x = 5;
        P (&x)
        print (x);
}
```
The output of this program is
a) 12 7 6 b) 22 12 11
c) 14 6 6 d) 7 6 6
[GATE 2003]

Q.9 In the following C program fragment j, k, n and Two Log _ n are integer variables, and A is an array of integers. The variable n is initialized to an integer ≥3 and Two Log _ n is initialized to the value of $2*\left|\log_2(n)\right|$
```
for (k=3; k <=n; k++)
        A[k] = 0;
for (k=2; k <= Two Log _ n; k++)
        for (j=k+1; j <=n; j++)
A[j] = A[j] || (j % k);
for (j=3; j<=n; j++)
        if (!A[j]) printf ("%d", j);
```
The set of numbers printed by this program fragment is
a) $\{m \mid m \le n, (\exists i)\ [m = !1]\}$
b) $\{m \mid m \le n, (\exists i)\ [m = i^2]\}$
c) $\{m \mid m \le n, m \text{ is prime}\}$
d) None
[GATE -2003]

Q.10 Consider the following C function;
```
void swap {int a, int b){
        int temp;
        temp a;
        a = b;
        b = temp;
}
```
In order to exchange the values of two variables x and y
a) Call swap (x, y)
b) Call swap (&x, &y)
c) Swap (x, y) cannot be used as it does not return any value
d) Swap (x, y) cannot be used as the parameters are passed by value
[GATE -2004]

Q.11 The goal of structured programming is to

a) Have well indented programs
b) Be able to infer the flow of control from the compiled code
c) Be able to infer the flow of control from the program text
d) Avoid the use of GOTO statements

[GATE -2004]

Q.12 Consider the following C-program

```
double foo (double);/* Line 1 */
int main 0 {
        double da, db;
        // input da
        db = foo (da);
}
double foo (double a) {
        return a;
}
```

The above code compiled without any error or warning. If Line 1 is deleted, the above code will show

a) No compile warning or error
b) Some compiler-warnings not leading to unintended results
c) Some compiler-warnings due to type-mismatch eventually leading to unintended results
d) Compiler errors

[GATE- 2005]

Q.13 Consider the following C- program:

```
void foo (int n, int sum) {
        int  k = 0, j = 0;
        if  (n==0) return;
        k = n % 10; j =n/10;
        sum = sum + k;
        foo (j, sum);
        printf ("%d", k);
}
int main () {
        int a= 2048, sum = 0;
        foo (a, sum);
        printf ("%d\ n", sum);
}
```

What does the above program print?

a) 8, 4, 0, 2, 14   b) 8, 4, 0, 2, 0
c) 2, 0, 4, 8, 14   d) 2, 0, 4, 8, 0

[GATE 2005]

Q.14 Which one of the following are essential features of an object-oriented programming language?

1. Abstraction and encapsulation
2. Strictly-typedness
3. Type-safe property coupled with sub-type rule
4. Polymorphism in the presence of inheritance

a) 1 and 2   b) 1 and 4
c) 1, 2 and 4   d) 1, 3 and .4

[GATE 2005]

Q.15 A common property of logic programming languages and functional languages is

a) Both are procedural languages
b) Both are based on λ- calculus
c) Both are declarative
d) Both use Horn-clauses

[GATE 2005]

Q.16 An Abstract Data Type (ADT) is

a) Same as an abstract class
b) A data type that cannot be instantiated
c) A data type for which only the operations defined on it can be used, but none else
d) All of the above

[GATE 2005]

Q.17 What does the following C-statement declares?

int (*f) (int *);

a) A function that takes an integer pointer as argument and returns an integer
b) A function that takes an integer as argument and returns an integer pointer
c) A pointer to a function that takes an integer pointer as argument and returns an integer
d) A function that takes an integer pointer as argument and returns a function pointer

[GATE 2005]

Q.18 Consider this C code to swap two integers and these five statements: The code

```
void swap (int *px, int *py) {
      *px = *px - *py;
      *py = *px + *py;
      *px = *py - *px;
}
```

S1: will generate a compilation error

S2: may generate a segmentation fa.0 It at runtime depending on the arguments passed

S3: correctly implements the swap procedure for all input pointers referring to integers stored in memory locations accessible to the process

S4: implements the swap procedure correctly for some but not all valid input pointers

S5: may add or subtract integers and pointers

a) S1 only b) S2 and S3

c) S2 and S4 d) S2 and S5

[GATE 2006]

Q.19 Consider these two functions and two statements S1 and S2

```
int work1 (int *a, int I,
int j)
{
     int x = a[i + 2];
     A[j] = x + 1;
     return a [i + 2] –
3;
}
```

```
int work2 (int *a, int I,
int j)
{      int t1 = i + 2;
       int t2 = a [t1];
       A[j] = t2 + 1;
       return t2-3
}
```

S1: The transformation from work1 to work2 is valid, i.e., for any program state and input arguments, work2 will compute the same output and have the same effect on program state as work1

S2: If the transformations applied to work to get work2 will always improve the performance (i.e.,. reduce CPU time) of work2 compared to work1

a) S1 is false and S2 is false

b) S1 is false and S2 is true

c) S1 is true and S2 is false

d) S1 is true and S2 is true

[GATE -2006]

Q.20 Consider the following C-function in which a[n] and b[m] are two sorted integer arrays and c[n+m] be another integer array.

```
void xyz (int a[ ], int b[ ] int c[ ]) {
        int i, j, k;
        i=j=k=0;
        while ((i<n) && (j<m))
        if (a[i] < b[j])
                c[k++]= a[i++];
        else
                c[k ++] = b[j++];
}
```

Which of the following condition hold(s) after the termination of the while loop?

(i) $j < m$, $k = n + j - 1$, and $a[n-1] < b[j]$, if $i = n$

(ii) $i < n$, $k = m + i - 1$, and $b[m-1] \leq a[i]$, if $j = m$

a) only (i)

b) only (ii)

c) either (1) or (ii) but not Both

d) neither (i) nor (ii)

[GATE -2006]

Q.21 Consider the following C function:

```
int f (int n){
        static int r = 0;
        if (n <= 0) return 1;
        if (n > 3){
                r = n;
                return f (n-2) + 2;
        }
        return  f (n-1) + r;
}
```

What is the value of f (5)?

a) 5 b) 7

c) 9 d) 18

[GATE -2007]

Q.22 Which combination of the integer variables x, y and z makes the variable a get the value 4 in the following expression?

```
a=(x>y)? ((x>z)? x: z): ((y> z)? y: z)
```
a) x = 3, y= 4, z = 2
b) x= 6, y =5 z =3
c) x =6, y=3,z = 5
d) x= 5, y = 4, z = 5

[GATE- 2008]

Q.23 Choose the correct to fill ?1and ?2 so that the program below prints an input string in reverse order. Assume that the input string is terminated by a newline character.

```
void reverse (void){
        int c;
        if (?1) reverse ( );
        ?2;
}
main ( ) {
        printf ("Enter Text");
        printf ("/n");
        reverse ( ); printf ("/n");
}
```
a) ?1 is (getchar ( )!= '\n')
b) ?1 is (c = getchar ( ))!= '\n')
?2 isgetchar (c);?2 is getchar (c);
c) ?1 is (c !='\n')
?2 isputchar (c);
d) ?1 is (c = getchar ( ))!= '\n')
?2 is putchar (c);

[GATE -2008]

Q.24 What is printed by the following C program?

```
int f (int x, int *py, int **ppz {
        int y, z;
        **ppz +=1;z = *ppz;
        *py+=2; y =*py;
        x +=3;
        return x + y+ z;
}
void main ( )
{
        int c, *b, **a,
        c=4; b=&c; a=&b;
        printf ("%d", f(c, b, a));
}
```
a) 18 b) 19
c) 21 d) 22

[GATE -2008]

Q.25 Consider the program below:

```
# include <studio.h>
int fun (int n, int*f_ p) {
        int t, f;
        if (n <=1) {
        *f_p=1;
        return 1;
}
        t= fun (n—1,*f _ p);
        f= t + *f _ p;
        *f_ p + t;
        return f;
}
int main {}
{
        int x=15;
        printf ("%d\n", fun (5, &x)};
        return 0;
}
```
The value printed is
a) 6 b) 8
c) 14 d) 15

[GATE- 2009]

Q.26 What does the following program print?

```
# include <stdio. h>
void f (int*p, int*q) {
        p=q;
        *p=2;
}
int i = 0, j = 1;
int main () {
        f (&i, & j};
        printf ("%d %d/n", i, j);
        return0 ;
}
```
a) 2 2 b) 2 1
c) 0 1 d) 0 2

[GATE-2010]

Q.27 The following program is to be tested for statement coverage begin

```
if (a == b) {S1; exit; }
else if (c = = d) {S2;}
else    {S3;exit;}
S4;
end
```

The test cases T_1, T_2, T_3 and T_4 given below are expressed in terms of the properties satisfied by the values of variables a, b, c and d. The exact values are not given.

T_1: a, b, c and d are all equal
T_2: a, b, c and d are all distinct
T_3: a=b and c! =d
T_4: a! = b and c=d

Which of the test suites given below ensures coverage of statementsS_1, S_2, S_3 and S_4?

a) T_1, T_2, T_3 b) T_2,T_4
c) T_3, T_4 d) T_1, T_2, T_4

[GATE- 2010]

Q.28 What is the value printed by the following C program?

```
#include < stdio.h>
int f(int *a, int n)
{
if (n<=0) return 0;
else if (*a %2= =0)
        return *a +f(a + 1, n-1);
else
        return *a - f(a+1, n-1);
}
int main ( )
{
        int a[ ] = {12, 7, 13, 4, 11 , 6};
        printf("%d*, f(a, 6));
        return 0;
}
```

a) -9 b) 5
c) 15 d) 19

[GATE -2010]

Common Data for Questions 29 and 30

Consider the following recursive C function that takes unsigned int foo (unsigned int, n, unsigned int r)

```
{
        if (n > 0) return (n%r + foo
(n/r, r));
        else return 0;
}
```

Q.29 What is the return value of the function foo, when it is called as foo (513, 2)?

a) 9 b) 8
c) 5 d) 2

[GATE -2011]

Q.30 What is the return value of the function foo, when it is called as foo (345, 10)?

a) 345 b) 12
c) 5 d)3

[GATE -2011]

Q.31 What does the following fragment of C-program print?

```
char c [ ] = "GATE 2011"
char *p = c;
printf ("%s", p+p[3]-p[1]);
```

a) GATE 2011 b) E2011
c) 2011 d) 011

[GATE-2011]

Common Data for Questions 32 and 33

Consider the following C code segment

```
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) ;
}
```

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

Q.32 What output will be generated by the given code segment?

```
a)3   1          b)4   2
  4   1            6   1
  4   2            6   1
```

```
c)4   2          d)3   1
  6   2            5   2
  2   0            5   2
```
[GATE-2012]

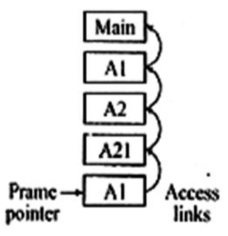
Q.33 What output will be generated by the given code segment if -
Line 1 is replaced by auto int a = 1;
Line 2 is replaced by register int a= 2?

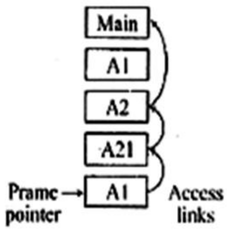
```
a)3   1          b)4   2
  4   1            6   1
  4   2            6   1
c)4   2          d)4   2
  6   2            4   2
  2   0            2   0
```
[GATE-2012]

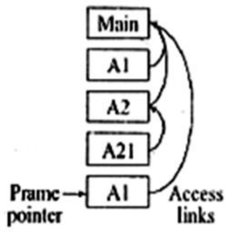
Q.34 Consider the program given below, in a block-structured pseudo-language with lexical scoping an nesting of procedures permitted.

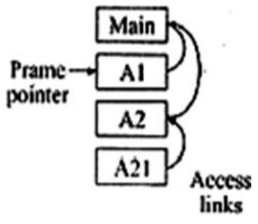
```
Program main;
Var .........
Procedure A1;
        Var ...
        Call A2 ;
        End  A1
Procedure A2;
        Var .........
Procedure A21;
        Var ...
Call A1;
        End  A2
        Call A21;
        End  A2
        Call A1;
End main.
```

Consider the calling chain:
Main → A1 → A2 → A21 → A1
The correct set of activation records along with their access links is given by

a) 

b) 

c) 

d) 

[GATE-2012]

Q.35 What is the return value of (p , p) , if the value of p is initialized to 5 before the call? Note that the first parameter is passed by reference, whereas the second parameter is passed by value.

```
int   f(int &x, int   c){
          c = c – 1;
          int  (c = = 0)  return  1 ;
          x = x + 1;
          return   f(x, c)  *  x :
}
```

a) 3024   b) 6561
c) 55440   d) 161051

[GATE-2013]

Q.36 Consider the C function given below

```
int f(int j)
{
static int i = 50;
int k;
if (i == j)
{
printf("something");
k = f(i);
return 0;
}
else return 0;
}
```
Which one of the following is TRUE?

a) The function returns 0 for all values of j.
b) The function prints the string something for all values of j.
c) The function returns 0 when j=50.
d) The function will exhaust the runtime stack or run into an infinite loop when j = 50

[GATE -2014]

Q.37 Consider the following pseudo code. What is the total number of multiplications to be performed?

```
D = 2
for i = 1 to n do
  for j = i to n do
     for k = j + 1 to n do
        D = D *3;
```
a) Half of the product of 3 consecutive integers
b) One third of the product of 3 consecutive integers
c) One-sixth of the product of 3 consecutive integers
d) None of the above

[GATE -2014]

Q.38 Consider the function func shown below:

```
int func(int num) {
int count = 0;
while (num) {
count++;
num>>= 1;
}
return (count);
}
```
The value returned by func(435) is ………………

[GATE -2014]

Q.39 Suppose n and p are unsigned int variables in a C program. We wish to set p to nC3.If n is large, which one of the following statements is most likely to set p correctly?

a) p = n * (n-1) * (n-2) / 6;
b) p = n * (n-1) / 2 * (n-2) / 3;
c) p = n * (n-1) / 3 * (n-2) / 2;
d) p = n * (n-1) * (n-2) / 6.0;

[GATE -2014]

Q.40 Consider the following function

```
double f (double x)
{
if ( abs( x*x – 3) < 0.01) return x;
else  return f (x/2+1.5/x);
}
```
Give a value q (to 2 decimal) such that f(q) will return q: ………………..

[GATE- 2014]

Q.41 Consider the following program in C language

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

[GATE -2014]

Q.42 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 ______

[GATE- 2015]

Q.43 Consider the following recursive C function.

```
void get (int n) {
        if (n<1) return;
        get (n-1);
        get(n- 3) ;
        print f (" %d",n) ;
}
```

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

a) 15 b) 25
c) 35 d) 45

[GATE -2015]

Q.44 Consider the following C program

```
#inclue <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)
        {
        case1:
        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 ________

[GATE -2015]

Q.45 Consider the following C program.

```
#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();
        printf("%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 ;
}
```

The output of the program is_______

[GATE- 2015]

Q.46 Consider the following function written the C programming language.

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

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

a) ABCD EFGH b) ABCD
c) HGFE DCBA d) DCBA

[GATE -2015]

Q.47 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

[GATE- 2015]

Q.48 Consider the following C program

```
#include <stdio.h>
 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 _________

[GATE -2015]

Q.49 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)

[GATE- 2016]

Q.50 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\n”, a);
}
```

The output of the program is ________.

[GATE -2016]

Q.51 The following function computes the maximum value contained in an integer array p[ ]of size n (n >= 1).

```
int max(int *p, int n)
{
int a = 0, b = n – 1;
while ( ______ )
{
if (p[a] <= p[b])
        { a = a+1; }
else
        { b = b-1; }
}
return p[a];
}
```

The missing loop condition is

a) a != n b) b != 0
c) b > (a + 1) d) b != a

[GATE -2016]

Q.52 What will be the output of the following pseudo-code when parameters are passed by reference and dynamic scoping is assumed?

```
a = 3;
void n(x)
{
x = x * a;
print(x);
}
void m(y)
{
a = 1;
a = y - a;
n(a);
print(a);
}
void main()
{
m(a);
}
```

a) 6, 2 b) 6, 6
c) 4, 2 d) 4, 4

[GATE -2016]

Q.53 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);
}
```

[GATE- 2016]

Q.54 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) $X^Y = (res*a)^b$

[GATE- 2016]

Q.55 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__________.

[GATE -2016]

Q.56 Consider the C struct defined below:

```
Struct data {
         int marks [100];
        char grade;
        int cnumber;
};
Struct data student;
```

The base address of student is available in register R1. The field student, grade can be accessed efficiently using

a) Post- increment addressing mode (R1)
b) Pre– decrement addressing mode.-(R1)
c) Register direct addressing mode E1.