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Programming - C

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GATE Syllabus

1. **Programming – C**
2. **Recursion**

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1 Data Type & Operators

Classroom Practice Questions :

Q.1 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        char ch=130;
        printf("%d",ch);
}
```

(A) 130 (B) 2 (C) 255 (D) – 126

Q.2 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        int a=3.0*4%2-3/2.0;
        printf("%d",a);
}
```

(A) 1 (B) 1.00000 (C) Compilation Error (D) None of these

Q.3 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a;
        a=3>2<1>4<6==0;
        printf("%d",a);
}
```

The output is _____

Q.4 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a;
        a=30>20>0!=2<50>40!=50;
        printf("%d",a);
}
```

The output is_____

Q.5 Consider the following program.

```
#include<stdio.h>
void main()
{
        int x;
        x=40;
        printf("%d%d%d",x!=100,x=100,x==60);
}
```

The output is _____

Q.6 Consider the following program.

```
#include<stdio.h>
void main()
{
        int x=12,y=1,z;
        z=y || ++x;
        printf("%d%d%d",x,y,z);
}
```

The output is_____

Q.7

```
#include<stdio.h>
void main()
{
        int a=1,b=-1,c=0,d;
        d=--a || ++b && c++;
        printf("%d%d%d%d",a,b,c,d);
}
```

The output is_____

Q.8 Consider the following program.

```
#include<stdio.h>
void main()
```

```
{
    int a=1,b=-1,c=0,d;
    d=--a || b++ && c++;
    printf("%d%d%d%d",a,b,c,d);
}
```

The output is_____

Q.9 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    int a = 2, b = 2, c = 0, d = 2, m;
    m = a++ && b++ && c++ || d++;
    printf("%d %d %d %d %d",a, b, c, d, m);
    return 0;
}
```

(A) Compilation error (B) 3 3 1 3 1 (C) 3 3 1 3 0 (D) some garbage value

Q.10 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
    int a;
    a= 10!=12>50? !4!=4?8>8!=0?10:20:30:40;
    printf("%d",a);
}
```

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

Q.11 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
    int a;
    a= 2 > 5 ? 1!=2>5?10:20:5<8?2!=2>5?!5?30:!1!=1?40:50:60:70;
    printf("%d",a);
}
```

(A) 40 (B) 50 (C) 60 (D) None of these

Q.12 Consider the following program.

```
#include<stdio.h>
void main()
```

```
{
        int a;
        a= 120 > 50 ? printf("GATE") && printf("CSE")||printf("pankaj"):printf("neeraj");
        printf("%d",a);
}
```

The output is_____

Q.13 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        int a=10 + 01 + 0x10;
        printf("%d",a);
}
```

(A) Compilation Error (B) 27 (C) 26 (D) 10

Q.14 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        int a=10 + 01 + 0XAc ;
        printf("%d",a);
}
```

(A) 183 (B) 34 (C) Compilation Error (D) None of these

Q.15 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        int a=10;
        printf("%d ",a);
        printf("%o ",a);
        printf("%x ",a);
}
```

The output is_____

Q.16 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        char num = '\010';
        printf("%d", num);
        return 0;
}
```

(A) 010 (B) 08 (C) 10 (D) 8

Q.17 Consider the following program. What will be the output?

```
#include<stdio.h>
int main()
{
        void  x=10;
        printf("%v", x);
        return 0;
}
```

(A) Compilation error (B) 10 (C) Garbage value (D) 0

Q.18 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a=sizeof(char)>-12 ;
        printf("%d",a);
}
```

The output is _____

Q.19 What will be the output of the C program?

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

(A) 7 9 (B) 4 16 (C) 9 7 (D) 16 4

Q.20 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        unsigned int num = -40;
        printf("%d", ~num);
        return 0;
}
```

(A) Compilation error (B) 39 (C) 40 (D) some garbage value

Q.21 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int x = 2;
        (x & 1) ? printf("GATE") : printf("ACADEMY");
        return 0;
}
```

(A) Compilation error (B) GATE (C) ACADEMY (D) Runtime error

Q.22 Consider the following C program **GATE 2017**

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

Q.23 What does the following code do? **GATE 1993**

```
var a, b : integer;
begin
        a : = a + b;
        b : = a – b;
        a : = a – b;
end
```

(A) Exchanges a and b (B) Doubles a and stores in b

(C) Doubles b and stores in a (D) Leaves a and b unchanged

Q.24 Suppose n and p are unsigned int variable in a C program. We wish to set p to ${}^{n}C_{3}$. If n is large, which one of the following statements is most likely to set p correctly? **GATE 2014**

(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) /2 * (n – 2) /6.0;

Q.25 Which combination of the integer variables x, y and z makes the variable a get the value 4 in the following expression? **GATE 2008**

```
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

Self-Practice Questions :

Q.1 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        char ch=-130;
        printf("%d",ch);
}
```

(A) -130 (B) 2 (C) 255 (D) 126

Q.2 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a;
        a=5>4>3>2>1>-1>0;
        printf("%d",a);
}
```

The output is _____

Q.3 Consider the following program.

```
#include <stdio.h>
int main()
{
         int a=4,b=5,c=6,d;
        d=++a || ++b && ++c;
        printf("%d%d%d%d",a,b,c,d);
        return 0;
}
```

The output is_____

Q.4 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a=4,b=5,c=6,d=7;
        int e;
        e=++a && ++b || --c && ++d ;
        printf("%d%d%d%d%d",a,b,c,d,e);
}
```

The output is_____

Q.5 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
        int a;
        a=20>100?100: !12!=3>50 ? 300 : 400 ;
        printf("%d",a);
}
```

(A) 100 (B) 300 (C) 400 (D) None of these

Q.6 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a;
        a= 120 > 50 ? printf("%d",printf("pankaj")):printf("neeraj");
        printf("%d",a);
}
```

The output is _____

Q.7 Consider the following program. What will be the output?

```
#include <stdio.h>
int main()
{
        int x;
        x = 2 > 5 != 1 ? 5 < 8 && 8 > 2 ? !5 ? 10 : 20 : 30 : 40;
        printf("Value of x:%d", x);
        return 0;
}
```

Q.8 What is the output of the following code ?

```
#include<stdio.h>
int main(){
        int num = - -10;
        printf("%d", num);
        return 0;
}
```

(A) Runtime error (B) Compilation error (C) -10 (D) 10

Q.9 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int a = 1, b = 3, c;
        c = b <<  a;
        b = c * (b * (++a)--);
        a = a >> b;
        printf("%d",b);
        return 0;
}
```

(A) 36 (B) Compilation error (C) 30 (D) 24

Q.10 Assuming integer is of 4 bytes ,the output of the following code :

```
#include<stdio.h>
void main()
{
        printf("%d",-1>>1);
        printf("%d",0<<1);
}
```

is_____

Q.11 Consider the following program.

```
#include <stdio.h>
int main()
{
        printf("%d",1<<2+3<<4);
        return 0;
}
```

The output is_____

Q.12 Consider the following program. What will be the output?

```
#include <stdio.h>
int main()
{
        char var=0x04;
        var = var | 0x04;
        printf("%d,",var);
        var |= 0x01;
        printf("%d",var);
        return 0;
}
```

(A) 8, 9 (B) 4, 5 (C) 8, 8 (D) 4, 4

Q.13 Which statement is suitable to check 2nd (count from 0) bit is high (set) or not?

(A) (num & (1<<2)) (B) (num & 0x04) (C) (num & 0x03) (D) Both (1) and (2)

Answers

Classroom Practice Questions									
1	D	2	C	3	0	4	1	5	0 100 0
6	12 1 1	7	0 0 0 0	8	0 0 1 0	9	B	10	B
11	A	12	GATECSE1	13	B	14	A	15	10 12 a
16	D	17	A	18	0	19	D	20	B
21	C	22	0	23	A	24	B	25	A
Self-Practice Questions									
1	D	2	1	3	5 5 6 1	4	5 6 6 7 1	5	C
6	pankaj61	7	Value of x : 20	8	D	9	B	10	– 10
11	512	12	B	13	D				

❖❖❖❖

2 Flow Control Statements

Classroom Practice Questions :

Q.1 Consider the following function **GATE 2014**

```
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 decimals) such that f (q) will reurn q:_____

Q.2 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a=10,b=20,c=30,d=2;
        if(a<b>c<10>=2+d)
        printf("pankaj");
        else
        printf("neeraj");
}
```

The output is _____

Q.3 Consider the following program.

```
#include<stdio.h>
void main()
{
        int a=10,b=20,c=30,d=2;
        if(a<10<b>c<10>=1)
        printf("pankaj");
        else
        printf("neeraj");
}
```

The output is_____

Q.4 Predict the output of the below program:

```
#include <stdio.h>
#define ONE 0
#define ZERO 1
int main()
{
    int i = 3;
    switch (i & 1)
    {
        case ONE: printf("Even");
        break;
        case ZERO: printf("Odd");
        break;
        default: printf("Default");
    }
    return 0;
}
```

Q.5 Output of following C program?

```
#include<stdio.h>
int main()
{
    int i = 0;
    for (printf("Pankaj\t"); i < 2 && printf("Hello\t"); ++i && printf("Hi\t"))
    {
        printf("00\t");
    }
    return 0;
}
```

Q.6 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    int i = 4, j = 5, k = 6;
    if(i > j == k)
        printf("%d %d %d", i++, ++j, --k);
    else
        printf("%d %d %d", i, j, k);
    return 0;
}
```

(A) 4 6 5 (B) 4 5 6 (C) 5 5 5 (D) 4 6 6

Q.7 What will be the output of the C program?

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

```
{
    int i;
    if(scanf("%d",&i)) //if we give input as 0
        printf("Pankaj");
    else
        printf("Sharma");
    return 0;
}
```

(A) Runtime Error (B) Compilation Error (C) Pankaj (D) Sharma

Q.8 Consider the following program. What will be the output?

```
#include<stdio.h>
void main()
{
    if(0xB)
    if(012)
    if('\x12')
    if('\012')
    printf("Pankaj Sharma");
    else;
    else;
    else;
    else;
}
```

(A) Pankaj Sharma
(B) Compilation error: Misplaced else
(C) Compilation error: If without any body
(D) Compilation error: Undefined symbol

Q.9 Consider the following C code. Assume that unsigned long int type length is 64 bits.

```
unsigned long int fun (unsigned long int n)
{
    unsigned long int i, j = 0, sum = 0;
    for( i = n; i > 1; i = i/2) j++;
    for (; j > 1; j = j/2)    sum ++;
    return (sum);
}
```

The value returned when we call fun with the input 2^{40} is **GATE 2018**

(A) 4 (B) 5 (C) 6 (D) 40

Q.10 How many times printf statement will execute

```
for(int i=1; i<=n; i++)
{
```

```
        for(int j=1; j<=10; j++)
    {
        printf("isko kahte hain nested loop");
    }
}
```

Q.11 How many times printf statement will execute(n>=1)

```
 for(int i=1; i<=n; i++)
{
    for(int j=1; j<=n; j++)
    {
        printf("ye hai independent nested loop");
    }
}
```

Q.12 How many times printf statement will execute(n>=1)

```
for(i=1;i<=n;i=i*2)
    printf("pankaj");
```

Q.13 Consider the following C function.

```
float f(float x, int y)
{
    float p, s; int i;
    for (s =1, p =1, i =1; i <y; i++)
    {
        p * = x/i;
        s + = p;
    }
    return s;
}
```

For large values of y, the return value of the function f best approximates **GATE 2003**

(A) x^y (B) e^x (C) In (1+x) (D) x^x

Q.14 Consider the C program fragment below which is meant to divide x by y using repeated subtraction. The variable x, y, q and r are all unsigned int. **GATE 2017**

```
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)

Q.15 The following function computes X^Y for positive integer X and Y.

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? **GATE 2016**

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

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

Q.16 What will be the output of following code?

```
#include<stdio.h>
void main()
{
        int i=0;
        for(++i; ++i; ++i)
        {
                printf("%d ",i);
                if(i==4) break;
        }
}
```

Q.17 Consider the following pseudo code, where x and y are positive integer.

begin

```
q : = 0;
r : = x;
while r ≥ y do
being r : = r – y ;
q : = q + 1 ; end
end
```

The post condition that needs to be satisfied after the program terminates is **GATE 2015**

(A) $\{r = qx + y \wedge r < y\}$ (B) $\{x = qy + r \wedge r < y\}$ (C) $\{y = qx + r \wedge 0 < r < y\}$ (D) $\{q + 10\}$

Q.18 What will be the output of the following code?

```
#include<stdio.h>
void main()
{
        int x=1, y=1;
        for( ; y ; printf("%d %d",x,y))
        {
                y=x++ <=5;
        }
}
```

Q.19 Consider the following program fragment for reversing the digits in given integer to obtain a new integer. Let $n=d_1d_2....d_m$.

```
int n, rev ;
rev = 0;
while (n > 0)
{
        rev = rev * 10 + n % 10;
        n = n /10;
}
```

The loop invariant condition at the end of the i^{th} iteration is : **GATE 2004**

(A) $n = d_1d_2....d_{m-i}$ and $rev = d_md_{m-i}...d_{m-i+1}$ (B) $n = d_{m-i+1}....d_{m-i}d_m$ or $rev = d_{m-1}...d_2d_1$

(C) $n \neq rev$ (D) $n = d_1d_2....d_m$ and $rev = d_m...d_2d_1$

Q.20 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int i = 1, j = 1;
        for(;j;printf("%d %d ",i, j))
```

```
        j = i++ <= 1;
        return 0;
}
```

Q.21 Let A be a square matrix of size $n \times n$. Consider the following pseudocode. What is the expected output?

GATE 2014

```
C =100;
for i = 1 to n do
for j = 1 to n do
{
        temp = A [i][j] +C;
        A[i][j] = A[j][i];
        A[j][i] = temp – C;
}
for i = 1 to n do
for j =1 to n do
output (A [i][j]);
```

(A) The matrix A itself
(B) Transpose of the matrix A
(C) Adding 100 to the upper diagonal elements and subtracting 100 from lower diagonal elements of A
(D) None of the above

Q.22 The output of the following code:

```
#include<stdio.h>
int main()
{
        int i = 1, j = 1;
        for(--i && j++ ; i<10; i+=2)
        {
                printf("loop ");
        }
        return 0;
}
```

is _____

Q.23 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        int a=10;
         if(printf("%d",a>=6)-6)
```

```
        for(;;)
                break;
        else;
}
```

(A) It will print nothing
(B) 1
(C) Compilation error: Misplaced else
(D) Infinite loop

Q.24 A typical "switch" body looks as follows:

```
switch (controlling_expression)
{
        case label1:
        /*label1 statements*/
                break;
        case label2:
        /*label2 statements*/
                break;
        default:
        /*Default statements*/
}
```

Which of the following statement is not correct statement?

(A) "switch" body may not have any "case" label at all and it would still compile.

(B) "switch" body may not have the "default" label and it would still compile.

(C) "switch" body may contain more than one "case" labels where the label value of these "case" is same and it would still compile. If "switch" controlling expression results in this "case" label value, the "case" which is placed first would be executed.

(D) "switch" body may not have any "break" statement and it would still compile.

(E) "switch" body can have the "default" label at first i.e. before all the other "case" labels. It would still compile.

Q.25 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        int movie=1;
        switch(movie<<2+movie)
        {
                default:printf("hey bhagwan");
                 case 4: printf(" bachale");
                 case 5: printf(" C programming ");
                 case 8: printf(" Se");
        }
}
```

Self-Practice Questions :

Q.1 What will be the output for inputs n=64 and n=23 respectively ?

```
#include<stdio.h>
int main()
{
        printf("enter the number");
        scanf("%d",&n);
        if(n & (n-1))
        printf("Mahol bana dia guru\n");
        else
        printf("Koi ni agli bar bana denge");
}
```

(A) Mahol bana dia guru Koi ni agli bar bana denge

(B) Koi ni agli bar bana denge Mahol bana dia guru

(C) Mahol bana dia guru Mahol bana dia guru

(D) Koi ni agli bar bana denge Koi ni agli bar bana denge

Q.2 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        int a=5,b=10,c=1;
         if(a&&b>c)
        {
                printf("Pankaj");
        }
        else
        {
                break;
        }
}
```

(A) Pankaj

(B) It will print nothing

(C) Run time error

(D) Compilation error

Q.3 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        int a=5,b=10;
        if(a<++a||b<++b)
```

```
        printf("%d  %d",a,b);
    else
        printf("Pankaj Sharma");
}
```

(A) 5 10 (B) 6 11 (C) 6 10 (D) Pankaj Sharma

Q.4 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
    int x=1,y=2;
    if(--x && --y)
        printf("x=%d  y=%d",x,y);
    else
        printf("%d %d",x,y);
}
```

(A) 1 2 (B) x=1 y=2 (C) 0 2 (D) x=0 y=1

Q.5 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
    int a=3;
    if(a--,--a,a--,a)
        printf("Pankaj");
    else
        printf("Sharma");
}
```

(A) Pankaj (B) Sharma (C) Run time error (D) Compilation error

How many times printf statement will execute from Q6 to Q9 (n>=1)

Q.6
```
for( int i=n; i>=1; i=i/2)
    printf("pankaj");
```

Q.7
```
for(int i= 1; i<=n; i=i*3)
    printf("GATE ACADEMY");
```

Q.8
```
for(int i=1; i<=n;)
    printf("pankaj");
```

Q.9
```
for(int i=n; i>=1; i=i/3)
    printf("GATE ACADEMY");
```

Q.10 Consider the following program. What will be the output?

```
#include<stdio.h>
        int main()
{
        int i,sum=0;
        for(i=1;i<=3;i++)
{
        int p=10;
        sum=sum+p;
}
        printf("%d",p);
        return 0;
}
```

(A)Compilation Error (B) 30 (C) 10 (D) None

Q.11 The output of the code :

```
#include<stdio.h>
int main()
{
        int i;
        for(i=0;i<6;i++)
        {
                int a=20;
                printf("%d",a);
                a++;
        }
        return 0;
}
```

is _____

Q.12 The number of times pankaj will be printed by the following code :

```
 #include<stdio.h>
void main()
{
        int I, J, n ;
        for ( I=1 ; I<=n ;I++ )
        for ( J=1 ; J<=I ; J++)
        printf("pankaj");
}
```

is_____

Q.13 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        switch(5||2|1)
        {
                case 3&2: printf("Pankaj Sharma");
                break;
                case -~11: printf("GATE");
                break;
                case 6-3<<2: printf("ACADEMY");
                break;
                case 5>=5: printf("First year");
        }
}
```

Q.14 What will be output when you will execute following c code?

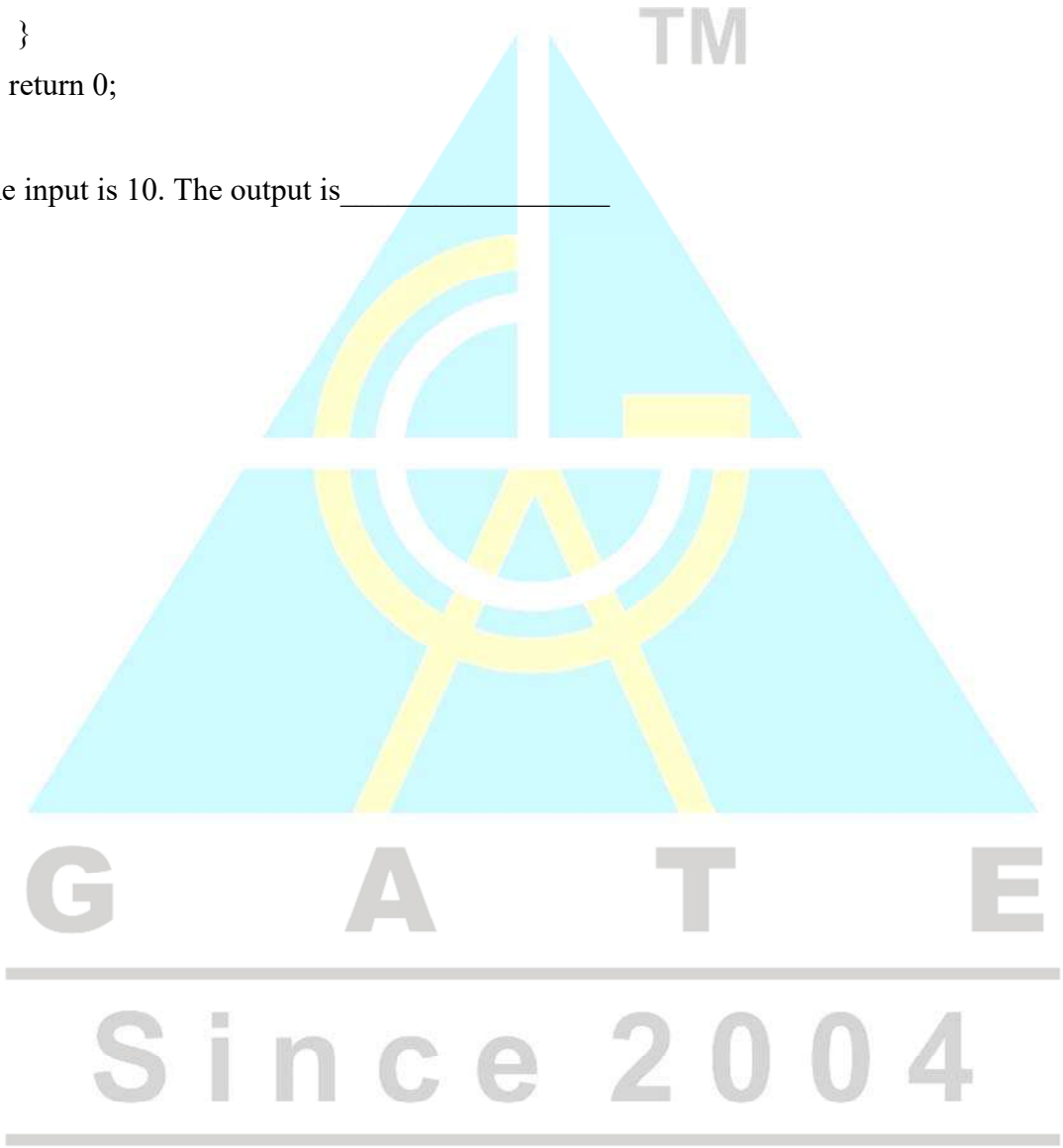
```
#include<stdio.h>
void main()
{
        int a=3,b=2;
        a=a==b==0;
        switch(1)
        {
                a=a+10;
        }
        sizeof(a++);
        printf("%d",a);
}
```

Q.15 Consider the following program.

```
int main()
{
        int i;
        printf("enter any number");
        scanf("%d",&i);
        switch(i)
        {
```

```
                default : printf("Neeraj");
                case 2 ... 10 : printf("GLA");
                case 1+2*3 : printf("CSE");
                 break;
                case 1||2 : printf("pankaj");
                 break;
                case 10.2 : printf("float");
        }
        return 0;
}
```

Assume input is 10. The output is_____



Answers

Classroom Practice Questions									
1	1.73	2	neeraj	3	pankaj	4	Odd	5	*
6	B	7	C	8	A	9	B	10	10n
11	n^2	12	$\log_2 n + 1$	13	B	14	C	15	C
16	2 4	17	B	18	*	19	A	20	2 1 3 0
21	A	22	*	23	B	24	C	25	Se
Self-Practice Questions									
1	B	2	D	3	D	4	C	5	B
6	$\log_2 n + 1$	7	$\log_3 n + 1$	8	infinite times	9	$\log_3 n + 1$	10	A
11	*	12	(n*(n+1))/2	13	Compilation Error	14	1	15	Compilation Error

Classroom Practice Questions

5 Pankaj Hello 00 Hi Hello 00 Hi

18 2 13 14 15 16 17 0

22 loop loop loop loop loop

Self-Practice Questions

11. 20 20 20 20 20 20

3 Function & Storage Class

Classroom Practice Questions :

Q.1 Consider the following C program:

```
double foo (double);   /* Line 1 */
int main ()
{
        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

GATE 2005

(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

Q.2 Which of the following is/are true regarding register variable :

(A) A register variable execute faster than other variables.

(B) Default initial value of register variable is garbage.

(C) Scope and visibility of register variable is block.

(D) The register modifier tells the compiler to do its best to keep the variable in a register if at all possible. Otherwise it is stored on the stack.

(E) All of these

Q.3 Which of the following is/are true regarding static variable :

(A) static variables are stored in a data segment.

(B) static variables have visibility from the point of declaration to the end of the enclosing scope.

(C) A same static variable can be declared many times but we can initialize it only one time.

(D) We cannot write any assignment statement globally.

(E) All of these

Q.4 Which of the following is/are true regarding static variable:

(A) A static variable initializes only one time in whole program.

(B) If we declared static variable locally then its visibility will within a block where it has declared.

(C) If declared a static variable or function globally then its visibility will only the file in which it has declared not in the other files.

(D) A static variable has internal linkage.

(E) All of these

Q.5 Where is static variable and auto variables stored respectively ?

(A) uninitialized data segment, stack (B) initialized data segment, stack

(C) data segment ,stack (D) heap ,stack

Q.6 Consider the following program

```
#include <stdio.h>
int main()
{
        int x = 1;
        static int y = x;
        y++;
        x++;
        printf("%d%d",x,y);
        return 0;
}
```

(A) 2 2 (B) 1 2 (C) 2 1 (D) Compilation Error

Q.7 The value of j at the end of the execution of the following C program. **GATE 2000**

```
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);
}
```

(A) 10 (B) 4 (C) 6 (D) 7

Q.8 Consider the following program:

```
#include<stdio.h>
void f1()
{
        static int my_x=1;
        my_x++;
        printf("%d",my_X);
 }
void f2()
{
        static int my_x=10;
        my_x++;
        printf("%d",my_X);
 }
int main()
{
        f1();
        f2();
        f1();
        f2();
        return 0;
}
```

The output of the above program is____?

(A) Compilation Error (B) Runtime error

(C) 2 11 3 12 (D) 1 10 2 11

Q.9 Consider the following C functions:

```
int  f(int n )
{
        static int i = 1;
        if  (n > = 5) return n  ;
        n = n + i ;
        i++;
        return f (n) ;
}
```

The value returned by f(1) is **GATE 2004**

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

Q.10 What is the output of the following program? **GATE 2004**

```
#include<stdio.h>
int funcf (int x);
int funcg (int y);
main ()
{
        int x=5, y=10, count;
        for (count = 1; count <=2; ++count)
        {
                y += funcf (x) + funcg (x);
                printf ("%d", y) ;
        }
}
funcf (int x)
{
        int y;
        y = funcg(x);
        return (y);
}
funcg (int x)
{
        static int y = 10;
        y + 1= 1;
        return (y + x);
}
```

(A) 43 80 (B) 42 74 (C) 33 37 (D) 32 32

Q.11 Consider the following C program

```
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);
}
```

What output will be generated by the given code segment? **GATE 2012**

	3 1		4 2		4 2		3 1
(A)	4 1	(B)	6 1	(C)	6 2	(D)	5 2
	4 2		6 1		2 0		5 2

Q.12 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" in previous question ?

	3 1		4 2		4 2		4 2
(A)	4 1	(B)	6 1	(C)	6 2	(D)	4 2
	4 2		6 1		2 0		2 0

Q.13 Consider the following C program. **GATE 2015**

```
# 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 _____.

Q.14 Consider the following C program:

```
#include <stdio.h>
int r( )
{
        static int num =7;
        return num--;
}
int main ( )
{
        for (r( );r( );r( ));
        printf ("%d",r( ));
        return 0;
}
```

Which one of the following values will be displayed on execution of the programs? **GATE 2019**

(A) 41 (B) 52 (C) 63 (D) 630

Q.15 What will be the output of the following program ?

```
int main()
{
        int y;
        static char x='A';
        x++;
        y=++x;
        printf("%d %d",x,y);
        return 0;
}
```

(A) Garbage 67 (B) 67 Garbage (C) 67 67 (D) None

Q.16 What will be the output of the C program?

```
#include<stdio.h>
static int i=2;
extern int i;
int main()
{
        printf("%d",i);
        return 0;
}
```

(A) 0 (B) 2 (C) Compilation Error (D) Runtime Error

Q.17 Find the output of the following code :

```
#include<stdio.h>
void Fun(int);
int main()
{
        Fun(3);
        return 0;
}
void Fun(int n)
{
        if(n>0)
        {
            Fun(n-1);
            printf("%d ",n);
            Fun(n-1) ;
        }
}
```

(A) 1211213 (B) 121 (C) 1213121 (D) 121121

Q.18 Find the output of the following code

```
#include<stdio.h>
int Fun(int);
int main()
{
        printf("%d",Fun(6));
        return 0;
}
int Fun(int n)
```

```
{
        if(n<=1)
        return n;
        return Fun(n/2) + Fun(n/2) +1;
}
```

(A) 3 (B) 6 (C) 7 (D) 4

Q.19 Find the output of the following code

```
#include<stdio.h>
int Fun(int);
int main()
{
        printf("%d",Fun(6));
        return 0;
}
int Fun(int n)
{
        if(n<=1)
        return n;
        return 2* Fun(n/2) +1;
}
```

(A) 3 (B) 6 (C) 7 (D) 4

Q.20 Find the output of the following code

```
#include<stdio.h>
int Fun(int);
int main()
{
        printf("%d",Fun(12));
        return 0;
}
int Fun(int n)
{
        if(n<=1)
        return n;
        return Fun(n/2) +n/2;
}
```

(A) 13 (B) 12 (C) 7 (D) 11

Q.21 Consider the following recursive C function that takes two arguments unsigned int foo(unsigned int n, unsigned int r)

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

What is the return value of the function foo when it is called as foo(345, 10) ? **GATE -2011**

(A) 345 (B) 12 (C) 5 (D) 3

Q.22 Find the output of the following code :

```
#include<stdio.h>
void Fun(int);
int main()
{
        Fun(3);
        return 0;
}
void Fun(int n)
{
        if(n>0)
        {
                printf("%d",n);
                Fun(n-1);
                printf("%d",n);
        }
}
```

(A) 332211 (B) 321321 (C) 321123 (D) None of these

Q.23 What will be the output of the following program ?

```
int main()
{
        f();f();
}
f()
{
        static int x;
        printf("%d", ++x);
}
```

(A) 0 1 (B) 1 2 (C) Garbage Garbage (D) None

Q.24 Consider the following C function.

```
int fun(int x)
{
        if(x>3)
        return fun(x-4) + fun(x-1) + 1;
        return 1;
}
```

The value returned by fun(12) is_____

Q.25 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

Q.26 Consider the following C function, what is the output? **GATE 2007**

```
#include <stdio.h>
 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;
}
int main()
{
        printf("%d", f(5));
}
```

(A) 5 (B) 7 (C) 9 (D) 18

Q.27 The following function computes the value of ${}^{m}C_{n}$ correctly for all legal values m and n ($m \geq 1, n \geq 0$ and $m > n$) **GATE 2006**

```
int func(int m, int n)
{
        if (E) return 1;
                else
        return(func(m -1, n) + func(m - 1, n - 1));
}
```

In the above function, which of the following is the correct expression for E?

(A) (n = = 0) || (m = = 1) (B) (n = = 0) && (m = = 1)

(C) (n = = 0) || (m = = n) (D) (n = = 0) && (m = = n)

Q.28 What is the output printed by the following 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;
}
```

(A) 5 (B) 8 (C) 9 (D) 20

Q.29 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? **GATE 2014**

(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.

Q.30 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 **GATE 2017**

(A) 53423122233445 (B) 53423120112233

(C) 53423122132435 (D) 53423120213243

Q.31 Consider the following C functions. **GATE 2020**

```
int fun1 (int n)
{
        static int i = 0;
        if (n > 0)
        {
                ++ i;
                fun1 (n – 1);
        }
        return (i);
}
int fun2 (int n)
```

```
{
        static int i = 0;
        if (n > 0)
        {
                i = i + fun1 (n);
                fun2 (n – 1);
        }
        return (i);
}
```

The return value of fun2(5) is _____ .

Q.32 What will be the output of the following C program? **GATE 2016**

```
void count (int n)
{
        static int d = 1;
        printf("%d", n);
        printf("%d", d);
        d++;
        if (n >1) count (n–1);
        print f("%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

Q.33 Consider the following recursive C function.

```
void get (int n)
{
        if (n < 1) return;
        get (n – 1);
        get (n – 3);
        printf ("%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 ()? **GATE 2015**

(A) 15 (B) 25 (C) 35 (D) 45

Q.34 What will be the output of the C program?

```
#include<stdio.h>
void fun(int);
int main()
{
        int a = 3;
        fun(a);
        return 0;
}
void fun(int n)
{
        if (n > 0)
        {
                fun(--n);
                printf("%d ", n);
        }
}
```

(A) 1 2 3 (B) No Output (C) 0 1 2 (D) 0

Q.35 Consider the following recursive C function that takes two arguments

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

What is the return value of the function foo when it is called as foo(513, 2)? **GATE 2011**

(A) 9 (B) 8 (C) 5 (D) 2

Q.36 The function f is defined as follows :

```
int f(int n)
{
        if (n < = 1)
        return 1;
        else if (n % 2= = 0)
        return f(n/2);
        else return f(3n - 1);
}
```

Assuming that arbitrarily large integers can be passed as a parameter to the function, consider the following statements. **GATE 2007**

(i) The function f termination for finitely many different values of $n \geq 1$.

(ii) The function f terminates for infinitely many different values of $n \geq 1$.

(iii) The function f does not terminate for finitely many different values of $n \geq 1$.

(iv) The function f does not terminate for infinitely many different values of $n \geq 1$.

Which one of the following options is true of the above?

(A) (i) and (iii) (B) (i) and (iv) (C) (ii) and (iii) (D) (ii) and (iv)

Q.37 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);
        getchar();
}
```

What does the above program print? **GATE 2005**

(A) 8, 4, 0, 2, 14 (B) 8, 4, 0, 2, 0 (C) 2, 0, 4, 8, 14 (D) 2, 0, 4, 8, 0

Q.38 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 : **GATE 2017**

(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.

Self-Practice Questions :

Q.1 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        fun();
        return  0;
}
void fun()
{
        printf("Pankaj");
}
```

(A) Pankaj (B) No output (C) Runtime error (D) Compilation error

Q.2 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        fun();
        return  0;
}
Int  fun()
{
        printf("Pankaj");
}
```

(A) Pankaj (B) No output (C) Runtime error (D) Compilation error

Q.3 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int fun(int);
         int i = fun(10);
        printf("%d\n", --i);
        return 0;
}
```

```
int fun(int i)
{
        return (i++);
}
```

The output is_____

Q.4 What will be the output of the C program?

```
#include<stdio.h>
int fun(int);
int main()
{
        int k=35;
        k = fun(k=fun(k=fun(k)));
        printf("k=%d\n", k);
        return 0;
}
int fun(int k)
{
        k++;
        return k;
}
```

The output is_____

Q.5 What will be the output of the C program?

```
#include <stdio.h>
void display();
int main()
{
        void display();
        void display();
        display();
        return 0;
}
void display();
{
        printf("Pankaj ");
}
```

The output is :

(A) Pankaj
(B) Pankaj Pankaj Pankaj
(C) No output will be printed
(D) Compilation Error

Q.6 What will be the output of the C program?

```
#include <stdio.h>
int main()
{
        int x=20,y=10;
        swap(x,y);
        printf("%d %d",y,x+2);
        return 0;
}
swap(int x,int y)
{
        int temp;
        temp=x;
        x=y;
        y=temp;
}
```

The output is :

(A) 20 12 (B) 12 20 (C) Compilation Error (D) None of these

Q.7 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int x = 2;
        {
                int x = 4;
        }
        printf("%d",x);
        return 0;
}
```

(A) garbage value (B) Compilation error (C) 4 (D) 2

Q.8 Which of the following code segments may give an error

(A)

```
#include<stdio.h>
int main()
{
        int x = 6;
        register int* a = &x ;
        printf("%d", *a);
        return 0;
}
```

(B)
```
#include<stdio.h>
int main()
{
    register int x= 6;
    int* a = &x;
    printf("%d", *a);
    return 0;
}
```

(C)
```
#include<stdio.h>
int main()
{
    int x = 6;
    register static int* a = &x;
    printf("%d", *a);
    return 0;
}
```

(D) Both B and C

Q.9 Which of the following is true regarding register variables ?

(A) Using & operator with register variable may raise an error.

(B) The keyword register can be used with pointer variables.

(C) The keyword static can not be used with register specifier.

(D) All of these

Q.10 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    extern num;
    printf("%d",num);
    return 0;
}
int num = 36;
```

(A) 36 (B) Runtime error

(C) 0 (D) Compile time error

Q.11 Which of the following codes will create an error

(A)
```
#include<stdio.h>
int a;
int main()
{
    printf("%d",a);
    return 0;
}
```

(B)

```
#include<stdio.h>
static int a;
int main()
{
        printf("%d",a);
        return 0;
}
```

(C)

```
#include<stdio.h>
extern int a;
int main()
{
        printf("%d",a);
        return 0;
}
```

(D) None

Q.12 What will be the output of the C program?

```
#include <stdio.h>
static char c;
static int i;
static float f;
int main()
{
        printf("%d %d %f ",c,i,f);
        return 0;
}
```

The output is _____

(A) 0 0 0.000000 (B) 0 0 0 (C) Compilation Error (D) None

Q.13 Which of the following code will create an error

(A)

```
#include <stdio.h>
static int i=12;
static int i;
static int i;
int main()
{
        static int i=14;
        printf("%d",i);
        return 0;
}
```

(B)
```
#include <stdio.h>
static int i=32;
static int i;
int main()
{
        printf("%d",i);
        return 0;
}
static int i=20;
```

(C)
```
#include<stdio.h>
int main()
{
        int a=12;
        int a;
        int a;
        printf("%d",a);
        return 0;
}
```

(D) Both B and C

Q.14 Which of the following will create an error

(A)
```
#include <stdio.h>
static int i=2;
i=55;
int main()
{
        printf("%d",i);
        return 0;
}
```

(B)
```
#include <stdio.h>
static int i=2;
int main()
{
        i=55;
        printf("%d",i);
        return 0;
}
```

(C) Both A and B

(D) None of these

Q.15 Which of the following will create an error?

(A)
```
#include<stdio.h>
int main()
{
    auto int i;
    printf("%d",i);
    return 0;
}
```

(B)
```
#include<stdio.h>
int main()
{
    int a=1;
    {
        int a=2;
        {
            int a=3;
            printf("%d",a);
        }
        printf(" %d",a);
    }
    return 0;
}
```

(C)
```
#include<stdio.h>
int main()
{
    {
        int a=2;
        printf("%d",a);
    }
    printf(" %d",a);
    return 0;
}
```

(D) None

Q.16 What will be output of following c code?

```
#include<stdio.h>
int main()
{
    int a=0;
```

```
        {
            int a=10;
            printf("%d",a);
            a++;
            {
                a=20;
            }
            {
                printf(" %d",a);
                int a=30; {a++;}
                printf(" %d",a++);
            }
            printf(" %d",a++);
        }
        printf(" %d",a);
        return 0;
    }
```

Q.17 What will be the output of the C program?

```
#include<stdio.h>
static int i=2;
extern int i=4;
int main()
{
    printf("%d",i);
    return 0;
}
```

(A) 2 (B) 4 (C) 0 (D) Compilation Error

Q.18 What will be the output of the C program?

```
void f(int n)
{
     if(n<=0)
     return;
     f(n-1);
    printf("%d",n);
    f(n-1);
}
```

The output of f(4) is _____

Q.19 What will be the output of the C program?

```
int f(int n)
{
        if(n<=1)
        return n;
        if(n%2)
        return f(n/2) + n;
        return f(n/3) + n;
}
```

The output of f(22) is_____

Q.20 The output of the code is :

```
int fun(int x)
{
        if(x%2==0)
        return fun(fun(x-1));
        else
        return(x++);
}
int main()
{
        printf("%d",fun(12));
        return 0;
}
```

(A)10 (B) 11 (C) 12 (D) None of these

Answers

Classroom Practice Questions									
1	D	2	E	3	E	4	E	5	C
6	D	7	A	8	C	9	C	10	A
11	C	12	D	13	230	14	B	15	C
16	B	17	C	18	C	19	C	20	D
21	B	22	C	23	B	24	51	25	C
26	D	27	C	28	C	29	D	30	A
31	55	32	A	33	B	34	C	35	D
36	D	37	D	38	C				
Self-Practice Questions									
1	A	2	D	3	9	4	k = 38	5	A
6	D	7	D	8	D	9	D	10	A
11	C	12	A	13	D	14	A	15	C
16	10 20 31 20 0	17	D	18	1213121 41213121	19	33	20	B

4 Array & Pointer

Classroom Practice Questions :

Q.1 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        int arr[4]={10,20};
         printf("%d",1[arr]);
}
```

(A) 0 (B) 10

(C) 20 (D) Compilation error

Q.2 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
         int 4[arr]={10,20};
        printf("%d",1[arr]);
}
```

(A) 0 (B) 10 (C) 20 (D) Compilation error

Q.3 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. **GATE 2015**

```
int main ()
{
        unsiged 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

Q.4 Consider the code :

```
void main ( )
{
        int a[4] = {10,20,30, 40,50}
        printf ("%u",a);
        printf("%u",a[0]);
        printf ("%u",a+1);
        printf ("%u",&a+1);
}
```

Assuming the base address of the array to be 1000 and size of integer is 4 byte, what are the values printed by printf( ) statements?

(A) 10 10 20 20 (B) 1000 1000 20 20

(C) 1000 10 20 1016 (D) 1000 10 1004 1016

Q.5 Consider the code:

```
void main ( )
{
    int a[2][3] = {1,2,3,4,5,6};
    printf ("%u",a);
    printf("%u",a[0]);
    printf("%u",a[0]+1);
    printf ("%u",&a+1);
    printf("%u",a[0][0]);
}
```

Assuming the base address of the array to be 1000 and size of integer is 4 byte, what are the values printed by printf( ) statements?

(A) 1000 1000 1004 1024 1 (B) 1000 1000 1012 1024 1

(C) 1000 1 1012 1024 1 (D) 1000 1000 1006 1024 1

Q.6 Assuming base address 100 and size of integer as 4 bytes

```
int a[3][2][2]={1,2,3,4,5,6,7,8,9,10,11,12};
printf("%u",a);
printf("%u",a+1);
printf("%u",*a);
printf("%u",*a+1);
printf("%u",&a +1);
printf("%u",**a);
printf("%u",***a);
printf("%u",**a +1);
printf("%u",***a +1);
```

What is the output of above printf statements regarding the 3D array declaration?

Q.7
```
void main ( )
{
    int a[2][3] = {1,2,3,4,5,6};
    printf ("%u %u %u", a, *a, **a);
    printf ("%u %u %u %u", a+1, *a+1, **a+1);
}
```
Assuming the base address of the array to be 1000 and integer size to be 4 byte, what are the values printed by printf statements?

(A) 1000 1000 1 1012 1004 5 (B) 1000 1000 1000 1012 1004 1004

(C) 1000 1000 1 1012 1008 5 (D) None of these

Q.8
```
void main ( )
{
    int a[2][3][2] = {1,2,3,4,5,6,7,8,9,10,11,12};
    printf("%u %u %u %u", a, *a, **a, ***a);
    printf ("%u %u %u %u", a+1, *a+1, **a+1, ***a+1);
}
```
Assuming the base address of the array to be 1000 and the size of integer is 4 bytes, what are the values printed by printf statements

Q.9 The output of the following code is:
```
#include<stdio.h>
int main()
{
    int a[2] = {1, 2};
    void *ptr = &a;
    ptr = ptr + sizeof(int);
    printf("%d", *(int *)ptr);
    return 0;
}
```
(A) 2 (B) 6 (C) Compilation Error (D) None of these

Q.10 What does the following declaration signifies :

(A) int (*p) [4] (B) int * (*p) [5]

(C) int * p[10] (D) int (*p) ( )

(E) int (*p) (int, int) (F) int (*p) (char *a)

Q.11 What does the following C-statement declare?

int (* f) (int *); **GATE 2005**

(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

Q.12 Consider the following program

```
#include<stdio.h>
int main()
{
        int a[4]={10,20,30,40};
        int *p[4]={a+3,a+2,a+1,a};
        int y;
        y=--p[0]-p[1];
        printf("%d",y);
        printf("%d",*p[0]);
}
```

(A) 0 20 (B) 1 30 (C) 0 30 (D) 0 10

Q.13 What will be the output of the following program?

```
#include<stdio.h>
int main()
{
        int a=5,b=10,c=15;
        int *p[3]={&a,&b,&c};
        printf("%d",*p[*p[1]-8]);
        return 0;
}
```

(A) Segmentation Fault (B) Compilation Error

(C) 15 (D) 10

Q.14 Consider the following C program **GATE 2015**

```
# 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_____.

Q.15 Consider the following program

```
#include<stdio.h>
int fun1()
```

```
{
        printf("GATE ACADEMY");
        return 0;
}
int fun2()
{
        printf("Pankaj");
        return 0;
}
int main()
{
        int (*p[2])();
        p[0] = fun1;
        p[1] = fun2;
        p[1]();
        return 0;
}
```

(A) Pankaj
(B) GATE ACADEMY
(C) Compilation Error
(D) pankajGATE ACADEMY

Q.16 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 **GATE 2003**

(A) 12 7 6 (B) 22 12 11 (C) 14 6 6 (D) 7 6 6

Q.17 Consider the following snippet of a C program. Assume that swap (&x, &y) exchanges the contents of x and y. **GATE 2017**

```
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] < array[i+1])
            {
                swap (& array [i], & array [i+1]);
                done = 0;
            }
        }
        for (i = 5; 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 _____.

Q.18 Consider the C code to swap two integers and these five statements. The code **GATE 2006**

```
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 fault 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 (B) S2 and S3 (C) S2 and S4 (D) S2 and S5

Q.19
```
#include <stdio.h>
void f(int *);
int main()
{
        int a[2][3]={1,2,3,4,5,6};
        f(a[1]);
        printf("%d %d",a[1][1],a[1][2]);
}
void f(int *p)
{       p--;
         *p=*p**p;
        p--;
        *p=*p**p;
}
```
The output is _____

Q.20 Assume the following C variable declaration
int *A [10], B[10][10];
Of the following expressions
1. A[2] 2. A[2][3]
3. B[1] 4. B[2][3]
Which will not give compile-time errors if used as left hand sides of assignment statements in a C program? **GATE 2003**
(A) 1, 2, and 4 only (B) 2, 3, and 4 only (C) 2 and 4 only (D) 4 only

Q.21 Consider the following C program. **GATE 2020**
```
# include <stdio. h>
int main ( )
{
        int a [4] [5] = { {1,2,3,4,5},
        {6,7,8,9,10},
        {11,12,13,14,15},
        {16,17,18,19,20} };
        print f  ("%d\n", *(*(a + ** a + 2 ) + 3) );
        return (0);
}
```
The output of the program is _____.

Q.22 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 invoking printxy (1, 1) is **GATE 2017**

(A) 0, 0 (B) 0, 1 (C) 1, 0 (D) 1, 1

Q.23 Which of the following declarations are allowed in c programming?

(i) int A[2][3]={1,2};
(ii) int A[][3]={1};
(iii) int A[2][]={1};
(iv) int A[][]={1};
(v) int A[][2][3]={1,2};
(vi) int A[][3];
(vii) int A[2][3];
(viii)int A[][3][4]={1};

Q.24 Consider the following program

```
#include <stdio.h>
void f(int (*)[]);
int main()
{
        int a[2][3]={1,2,3,4,5,6};
        f(a);
        printf("%d %d %d",a[1][0],a[1][1],a[1][2]);
}
void f(int (*p)[3])
{       p++;
         **p=**p***p;
        **(p+1)=**(p+1)***(p+1);
}
```

The output is _____

Q.25 What is the value printed by the following C program? **GATE 2010**

```
#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));
        getchar();
        return 0;
}
```

(A) -9 (B) 5 (C) 15 (D) 19

Q.26 Consider the program below :

```
# include <stdio . 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 : **GATE 2009**

(A) 6 (B) 8 (C) 14 (D) 15

Q.27 Which one of the choices given below would be printed when the following program is executed? **GATE 2006**

```
#include <stdio.h>
void swap (int*x, int*y)
{
        static int*temp;
        temp = x;
        x = y;
        y = temp ;
}
void printab ()
{
        static int i, a = –3, b = – 6;
        i = 0;
        while (i<=4)
        {
                if ((i++)% 2 == 1) continue;
                a = a+i;
                b = b+i;
        }
        swap (&a, &b);
        printf ("a =%, b= %d\n", a, b);
}
main ()
{
        printab();
        printab();
}
```

(A) a = 0, b = 3
a = 0, b = 3 (B) a = 3, b = 0
a = 12, b = 9 (C) a = 3, b = 6
a = 3, b = 6 (D) a = 6, b = 3
a = 15, b = 12

Q.28 Consider the following program : **GATE 2016**

```
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 _____.

Q.29 Consider the following program

```
#include <stdio.h>
void f(int *);
int main()
{
         int a[]={1,2,3,4,5};
         f(a+1);
        printf("%d %d",a[2],a[3]);
}
void f(int *p)
{
        *p=*p**p;
        *(p+1)=*(p+1)**(p+1);
         *(p+2)=*(p+2)**(p+2);
}
```

(A) 9 16 (B) 4 9 (C) Compilation Error (D) None

Q.30

```
#include <stdio.h>
#include <stdlib.h>
int main(void)
{
         int i;
         int *ptr = (int *) malloc(5 * sizeof(int));
        for (i=0; i<5; i++)
                *(ptr + i) = i;
        printf("%d ", *ptr++);
        printf("%d ", (*ptr)++);
        printf("%d ", *ptr);
        printf("%d ", *++ptr);
        printf("%d ", ++*ptr);
}
```

(A) Compiler Error (B) 0 1 2 2 3 (C) 0 1 2 3 4 (D) 1 2 3 4 5

Q.31 Consider the following C code :

```
#include<stdio.h>
int *assignval (int *x, int val)
{
        *x = val;
        return x;
}
void main ()
{
        int *x = malloc (sizeof (int));
        if (NULL = = x) return;
        x = assignval (x, 0);
        if (x)
        {
                x = (int *) malloc (sizeof (int));
                if (NULL = = x) return;
                x = assignval (x, 10);
        }
        printf("%d/n", *x);
        free (x);
}
```

The code suffers from which one of the following problems : **GATE 2017**

(A) Compiler error as the return of malloc is not typecast appropriately

(B) Complier error because the comparison should be made as x = = NULL and not as shown

(C) Complies successfully but execution may result in dangling pointer

(D) Complies successfully but execution may result in memory leak

Q.32 Consider the following three C functions : **GATE 2001**

[P1]

```
int * g (void)
{
        int x = 10;
        return (&x);
}
```

[P2]

```
int * g (void)
{
        int * px;
        *px = 10;
        return px;
}
```

[P3]

```
int *g (void)
{
        int *px;
        px = (int *) malloc (sizeof(int));
        *px = 10;
        return px;
}
```

Which of the above three functions are likely to cause problems with pointers?

(A) Only P3 (B) Only P1 and P3 (C) Only P1 and P2 (D) P1, P2 and P3

Q.33 The most appropriate matching for the following pairs **GATE 2000**

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

(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

Q.34 Consider the following C functions. **GATE 2020**

```
int  tob (int  b, int* arr)
{
        int i;
        for  (i = 0; b > 0; i++)
        {
            if (b%2)  arr [i] = 1;
            else arr [i] = 0;
            b = b/2;
        }
        return (i);
}
int pp (int a, int b)
{
        int arr [20];
        int i, tot = 1, ex, len;
        ex = a;
        len = tob (b, arr);
        for  (i = 0; i < len; i++)
```

```
        {
            if (arr [i]==1)
            tot = tot*ex;
            ex =ex*ex;
        }
        return (tot);
}
```

The value returned by pp(3,4) is _____ .

Q.35 The value printed by the following program is _____. **GATE 2016**

```
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);
}
```

Q.36 Consider the following C program. **GATE 2016**

```
#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 _____.

Q.37 What is the return value of f(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. **GATE 2013**

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

(A) 3024 (B) 6561 (C) 55440 (D) 161051

Q.38 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. **GATE 2004**

(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

Q.39 Consider the C program below. What does it print? **GATE 2008**

```
# include <stdio.h>
# define swapl (a.b) tmp = a ;
a = b;
b = tmp;
void  swap2 ( int a, int b)
{
        int tmp ;
        tmp = a;  a=b; b=tmp;
}
void swap3 (int *a , int*b)
{
        int  tmp;
        tmp  = *a; *a =*b; *b= tmp;
}
```

```
int main ( )
{
        int  num1=5, num2  =4, tmp;
        if (num1<num2)
        {
                swap1 ( num1, num2) ;
        }
        if  (num1 <num2)
        {
                swap2 (num1+1, num2) ;
        }
        if (num1 >= num2)
        {
                swap3 (&num1,&num2) ;
        }
        printf ("%d, %d", num1, num2 ) ;
}
```

(A) 5, 5 (B) 5, 4 (C) 4, 5 (D) 4, 4

Q.40 What does the following program print? **GATE 2010**

```
# 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);
        return 0;
}
```

(A) 2 2 (B) 2 1 (C) 0 1 (D) 0 2

Q.41 The output of the following C program is _____. **GATE 2015**

```
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;
}
```

Q.42 Consider the following C program.

```
void f (int, short);
void main ( )
{
        int i = 100;
        short s = 12;
        short *p = &s;
        _________;
}
```

Which one of the following expressions, when placed in the blank above, will NOT result in a type checking error? **GATE 2016**

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

Q.43 Consider the C program given below. What does it print? **GATE 2008**

```
# include <stdio.h>
int main ( )
{
        int i, j ;
        int a [ 8 ] = { 1, 2, 3, 4, 5, 6, 7, 8 } ;
        for ( i = 0 ; i <3 ; i ++ )
        {
                a [ i ] = a [ i ]  + i ;
                i  ++ ;
        }
        i  – – ;
        for  ( j = 7 ;  j > 4 , j – – )
```

```
        {
                int  i = j/2 ;
                a[ i ] = a [ i ] – 1 ;
        }
        printf ( " %d, %d", i, a [ i ] ) ;
}
```

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

Q.44 Consider the following C program : **GATE 2019**

```
#include <stdio.h>
int main ( )
{
        int a [ ] = {2, 4, 6, 8, 10};
        int i, sum = 0, *b = a + 4;
        for (i = 0, i < 5, i ++)
        sum = sum + (*b – i) - * (b – i);
        printf ("%d\n", sum);
        return 0;
}
```

The output of the above C program is _____.

Q.45 Consider the following C program: **GATE 2019**

```
# include <stdio.h>
int main ()
{
        int arr[ ]={1,2,3,4,5,6,7,8,9,0,1,2,5}, *ip=arr+4;
        printf ("%d\n",ip[1]);
        return 0;
}
```

The number that will be displayed on execution of the program is _____.

Q.46 Which one of the choices given below would be printed when the following program is executed?

GATE 2006

```
#include<stdio.h>
int a1[]={6, 7, 8, 18, 34, 67};
int a2[]={23, 56, 28, 29};
int a3[]={–12, 27,–31};
int *x[]={a1, a2, a3};
void print (int*a[])
```

```
{
        printf("%d",a[0][2]);
        printf("%d",*a[2]);
        printf("%d",*++a[0]);
        printf("%d",*(++a)[0]);
        printf("%d\n",a[–1][+1]);
}
main ()
{
        print(x);
}
```

(A) 8, –12, 7,23, 8 (B) 8, 8, 7, 23, 7

(C) –12, –12, 27, –31, 23 (D) –12, –12, 27, –31, 56

Self-Practice Questions :

Q.1 If the address of pointer ptr is 2000, then what will the output of following program ? [Assuming 4 bytes integer size]

```
#include <stdio.h>
int main()
{
        void *ptr;
        ++ptr;
        printf("%u",ptr);
        return 0;
}
```

(A) 2004 (B) 2001 (C) 2000 (D) ERROR

Q.2 Consider the following program

```
void main ( )
{
        int a[2][3][2] = {1,2,3,4,5,6,7,8,9,10,11,12};
        printf("%u", a);
        printf ("%u", a[0]);
        printf ("%u", a[0][0]);
        printf ("%u", &a);
        printf ("%u", a[0]+1);
        printf ("%u", a[0][0]+1);
}
```

Assuming the base address of the array to be 1000 and size of integer is 4 bytes, what are the values printed by printf( ) statements?

(A) 1000 1000 1 1000 1012 1004 (B) 1000 1000 1000 1000 1008 1004

(C) 1000 1000 1000 1000 1004 1002 (D) None of these

Q.3 The output of the program?

```
#include<stdio.h>
void main()
{
        int a[3]={0,1,2};
        int i,j,k;
        i=++a[0];
        j=a[0]++;
        k=a[++i];
        printf("%d %d %d",i ,j, k);
}
```

is _____

Q.4 Consider the following program

```
#include <stdio.h>
void foo(int[][3]);
int main(void)
{
        int a[2][3][3] = {{ {1, 2, 3}, {4, 5, 6}, {7, 8, 9}}, { {11, 12, 13}, {14, 15, 16}, {17, 18, 19}}};
        foo(a[1]);
        return 0;
}
        void foo(int b[][3])
{
        ++b;
         b[1][1] = 9;
}
```

After execution of the above code the value updated is

(A) 9 (B) 15 (C) 18 (D) None

Q.5 What will be the output when you will execute the following *C* code?

```
void main ( )
{
        int a[2][3] = {5,10,15,20,25,30};
        int (*p)[2][3]=&a;
        printf("%d \t",*** ptr);
```

```
        printf("%d \t",***(ptr+1));
        printf("%d \t",**(*ptr+1));
        printf("%d \t",*(*(*ptr+1)+2));
}
```

(A) 5 Garbage 20 30 (B) 10 15 30 20
(C) 5 15 20 30 (D) C.E
(E) none

Q.6 What will be output when you will execute following c code?

```
#include<stdio.h>
void main()
{
        int arr[4][2]={3,6,9,12,15,18,21,24};
        printf("%d  %d",*(arr+2)[1],**(arr+3));
}
```

Choose all that apply:
(A) 15 21 (B) 18 21 (C) 15 15 (D) 21 21

Q.7 Which of the following will print the value 2 for the above code?

```
#include<stdio.h>
int main()
{
        int a[10][20][30] = {0};
        a[5][2][1] = 2;
        return 0;
}
```

(A) printf("%d",*(((a+5)+2)+1)); (B) printf("%d",***((a+5)+2)+1);
(C) printf("%d",*(*(*(a+5)+2)+1)); (D) None of these

Q.8 What is the output of the following program?

```
#include <stdio.h>
int main()
{
        int a[][3] = {1, 2, 3, 4, 5, 6};
        int (*ptr)[3] = a;
        printf("%d %d ", (*ptr)[1], (*ptr)[2]);
        ++ptr;
        printf("%d %d\n", (*ptr)[1], (*ptr)[2]);
        return 0;
}
```

(A) 2 3 5 6 (B) 2 3 4 5 (C) 4 5 0 0 (D) none of the above

Q.9 What is the output of the following code?

```
#include <stdio.h>
int main()
{
        int a[5] = {1,2,3,4,5};
        int *ptr = (int*)(&a+1);
        printf("%d %d", *(a+1), *(ptr-1));
        return 0;
}
```

(A) 2 5 (B) Garbage value

(C) Compiler Error (D) Segmentation fault

Q.10 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int a[][3] = {0, 1, 2, 3, 4, 5};
        int (*ptr)[3] = a;
        printf("%d %d ", (*ptr)[0], (*ptr)[1]);
        ++ptr;
        printf("%d %d\n", (*ptr)[0], (*ptr)[1]);
        return 0;
}
```

(A) 0 1 3 4 (B) 0 1 0 1 (C) 0 1 2 3 (D) 0 1 1 2

Q.11 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int a[2][3][2]={{{1,2},{3,4},{5,6}},{{7,8},{9,10},{11,12}}};
        int *ptr =a[0][0];
        ptr++;
        *++ptr;
        ++*ptr;
        ++ptr;
        printf("%d%d",*(ptr-1),*ptr);
        return 0;
}
```

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

Q.12 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        int a[2][3][2]={{{1,2},{3,4},{5,6}},{{7,8},{9,10},{11,12}}};
        int *ptr =a[0][0];
        ptr++;
        ++*ptr;
        ++*ptr;
        ++*ptr;
        printf("%d%d",*(ptr-1),*ptr);
        return 0;
}
```

(A) 4 5 (B) 3 4 (C) 1 5 (D) Compilation Error

Q.13 Consider the following program

```
#include<stdio.h>
void main()
{
        int array[10];
        int *i = &array[2], *j = &array[5];
        int diff = j-i;
        printf("%d", diff);
}
```

(A) 3 (B) 6 (C) Garbage value (D) Error

Q.14 Consider the following program

```
#include <stdio.h>
int * build_array();
int main()
{
        int *a,k;
        a = build_array();
        for (k = 0; k < 5; k++)
        printf("%d ", a[k]);
         return 0;
}
int * build_array()
{
        int arr[5]={1,2,3,4,5};
         return arr;
}
```

The output is :

(A) 1 2 3 4 5 (B) Segmentation Error

(C) Null pointer Error (D) None

Q.15 Consider the following program

```
#include <stdio.h>
int * build_array();
int main()
{
        int *a,k;
        a = build_array();
        for (k = 0; k < 5; k++)
        printf("%d ", a[k]);
        return 0;
}
int * build_array()
{
        static int arr[5]={1,2,3,4,5};
        return arr;
}
```

The output is :

(A) Compilation Error (B) Runtime Error

(C) 1 2 3 4 5 (D) None

Q.16 Consider the following program. What will be the output

```
#include <stdio.h>
int main()
{
        int a=10,x;
        int *p,**q;
        p=&a;
        q=&p;
        x=a**p***q;
        printf("%d",x);
        return 0;
}
```

(A) 100 (B) 1000 (C) 10 (D)Error

Q.17 Consider the following program. What will be the output

```
#include<stdio.h>
int main()
{
        int a=20,*p;
        p=&a;
        *p=++a -*p;
```

```
        printf("%d",*p);
        return 0;
}
```

(A) 0 (B) 21 (C) 20 (D) 1

Q.18 Consider the following program

```
#include<stdio.h>
void fun(int);
int main()
{
        void (*ptr)(int ) = fun;
        (*ptr)(2);
        return 0;
}
void fun(int n)
{
         int i;
        for(i=1;  ; i++)
        {
                 if(i<=n)
                printf("pankaj");
                else
                break;
        }
}
```

The output is :

(A) Compilation Error (B) Runtime Error

(C) Will print pankaj infinite times (D) pankajpankaj

Q.19 Consider the following program

```
void fun(int n);
#include<stdio.h>
int main()
{
        void (*ptr)(int ) = fun;
        (*ptr)(2);
        return 0;
}
void  fun(int n)
{
        for(i=1;; i++)
        {
                if(i<=n)
                printf("Pankaj");
        }
}
```

The output of the program is _____?

Q.20 A function 'p' that accepts a pointer to a character as argument and returns a pointer to an array of integer can be declared as

(A) int(*p(char *))[] (B) int *p(char *)[] (C) int (*p) (char *)[] (D) None of these.

Answers

Classroom Practice Questions									
1	C	2	D	3	A	4	D	5	A
6	*	7	D	8	*	9	C	10	*
11	C	12	C	13	C	14	1 40	15	A
16	A	17	3	18	C	19	5 6	20	A
21	19	22	C	23	*	24	16 5 6	25	C
26	B	27	D	28	3	29	A	30	B
31	D	32	C	33	D	34	81	35	30
36	2016	37	B	38	D	39	C	40	D
41	–5	42	D	43	C	44	10	45	6
46	A								
Self-Practice Questions									
1	D	2	D	3	211	4	C	5	A
6	D	7	C	8	A	9	A	10	A
11	A	12	C	13	A	14	D	15	C
16	B	17	A	18	D	19	*	20	A

Classroom Practice Questions

6. 100 116 100 108 148 100 1 104 2

8. 1000 1000 1000 1 1024 1008 1004 2

10. A) p is a pointer to an array of 4 integer.

B) p is a pointer to an array of 5 pointer to integers.

C) p is an array of 10 pointer to integer.

D) p is a pointer to a function that takes no arguments and returns an integer value.

E) p is a pointer to a function that takes 2 integer arguments and it returns an integer value.

F) p is a pointer to a function that takes a pointer to character as argument and returns an integer.

23. i, ii, v, vi, vii, viii are valid

Self-Practice Questions

19. Pankaj infinite times

5 String

Classroom Practice Questions :

Q.1 What will be the output of the following program?

```
#include<stdio.h>
int main()
{
        char arr[10];
        arr="hello";
        printf("%s",arr);
        return 0;
}
```

(A) hello (B) h (C) Null (D) Compilation error

(E) None of these

Q.2 Consider the following program:

```
void main ( )
{
        char str[ ] = ”GATE ACADEMY”;
        printf("%s %s %s, &str[5], &5[str], str+5);
}
```

What will we get after the execution of the program__

(A) Runtime Error (B) ACADEMY ACADEMY ACADEMY

(C) CADEMY CADEMY CADEMY (D) Compiler Error

Q.3 Consider the following program:

```
#include<stdio.h>
int main()
{
    char arr[]="pankaj";
    char arr1[]="pankaj";
```

```
    if((arr+1)==(arr1 + 1))
    printf("Constant Strings");
    else
    printf("This will execute");
    return 0;
}
```

(A) Compilation Error (B) Runtime Error
(C) Constant Strings (D) This will execute

Q.4 Consider the following program:

```
void main ( )
{
        char name [ ] = "Pankaj";
        printf(name + 2);
        printf("%s", name + 2);
        printf("%s", &name[2]);
}
```

Output of the program?

(A) Compilation Error (B) Pankaj Pankaj Pankaj
(C) nkaj nkaj nkaj (D) some Address nkaj nkaj

Q.5 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? **GATE 2015**

(A) 12 (B) 120400 (C) 12041 (D) 1034

Q.6 What does the following fragment of C-program print? **GATE 2011**

```
char c[] = "GATE2011";
char *p = c;
printf("%s",p+p[3]-p[1]);
```

(A) GATE2011 (B) E2011 (C) 2011 (D) 011

Q.7 C program is given below:

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

```
{
        int i, j;
        char a [ 2 ] [ 3 ] = {{ 'a', 'b', 'c'}, {'d',  'e', 'f'} } ;
        char b[3] [2];
        char *p = *b;
        for ( i=0; i < 2; i ++ 0)
        {
                for ( j = 0; j < 3; j ++ )
                {
                        * (p + 2*j  + i) = a [i] [j] ;
                }
        }
}
```

What should be the contents of the array b at the end of the program? **GATE 2008**

(A) a b c d e f	(B) a d b e c f	(C) a c e b d f	(D) a e d c b f

Q.8 What is the output printed by the following C code ? **GATE 2008**

```
# include <stdio.h>
int  main ( )
{
        char a [ 6 ] = "world"  ;
        int i,  j ,  ;
        for ( i = 0, j = 5; i < j ; a [ i ++ ] = a [ j- - ] );
        printf ( " % s\n", a );
}
```

(A) dlrow (B) Null string (C) dlrld (D) worow

Q.9 Consider the following C program segment:

```
char p [20] ;
char * s = "string'';
int length = strlen (s) ;
for (i=0;i<length;i++)
p[i] = s[length – i];
printf("%s",p);
```

The output of the program is **GATE 2004**

(A) gnirts (B) string

(C) gnirt (D) no output is printed

Q.10 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    char *ptr;
    char str[] = "learn C from Pankaj_sir";
    ptr = str;
    ptr += 12;
    printf(ptr);
    return 0;
}
```

(A) Compilation Error
(B) Runtime error
(C) Pankaj_sir
(D) C from Pankaj_sir

Q.11 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
        char *ptr;
        char str[] = "Gurupal_sir";
        ptr = str;
        ptr += 4;
        *ptr='\0';
        printf(ptr);
        return 0;
}
```

(A) No Output will be printed
(B) pal_sir
(C) Guru\0al_sir
(D) Guru

Q.12 Consider the following C program. **GATE 2017**

```
#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 program is _____.

Q.13 Consider the following C program. **GATE 2017**

```
#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 _____.

Q.14 Choose the correct option to fill ?1 and ?2 so that the program below prints an input string in reverse order. Assume that the input string is terminated by a newline character. **GATE 2008**

```
void reverse (void)
{
    int c;
    if (?1) reverse ();
    ?2
}
int main ()
{
    printf (" Enter Text ");
    printf ("\n");
    reverse ();
    printf ("\n");
}
```

(A) ?1 is (getchar () ! = '|n')
    ?2 is getchar (c);

(B) ?1 is (c = getchar ()) ! = '\n')
    ?2 is getchar (c);

(C) ?1 is (c ! = '\n')
    ?2 is putchar (c);

(D) ?1 is ((c = getchar ()) ! = '\n')
    ?2 is putchar (c);

Q.15 Consider the following function written in 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 **GATE 2015**

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

Q.16 Consider the following program:

```
include<stdio.h>
void main()
{
    char *GA[4+~0]={"Umesh_sir","Pankaj_sir","Gurupal_sir"};
    char *ptr=GA[2+~0];
    *++ptr;
    ++ptr;
     printf("%c",*++ptr);
}
```

Choose all that apply:

(A) a (B) n (C) k (D) Compilation error

Q.17 What will be the output of the following code ?

```
#include<stdio.h>
int main()
{
    char name[]="pankaj"
    int a = sizeof(name);
    int b= strlen(name)
    printf("%d%d",a,b);
    return 0;
}
```

(A) 6 6 (B) 7 6 (C) 6 7 (D) 7 7

Q.18 What will be the output of the following code ?

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

```
{
    char arr[]={'p', 'a', 'n', 'k','a', 'j', '\0'};
    char *ptr="pankaj";
    char name[]="pankaj";
    printf("%d%d%d",strlen(arr),strlen(ptr),strlen(name));
    return 0;
}
```

(A) 7 6 7 (B) 7 7 7 (C) 6 6 7 (D) 6 6 6

Q.19 Consider the following program

```
#include<sdio.h>
int main()
{
        char * p[] = {"Gurupal", "Pankaj",  "Yadunath", "Ramesh", "GATE", "ACADEMY" };
        char ** q[] = {p + 3, p + 2, p + 4, p, p + 5, p + 1};
        char *** r = q + 1;
        printf("%s", *-- *++r);
        return 0;
}
```

The output is _____

Q.20

```
#include<stdio.h>
int main()
{
    char arr[7]={“pankaj”};
    char *ptr =”sharma”;
    ptr=arr+3
    strcpy(arr,ptr);
    printf(“%c”,*arr +2);
    return 0;
}
```

The output of the code is_____

Self-Practice Questions :

Q.1 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    char *ptr;
    char str[] = "Gurupal_sir";
    ptr = str;
```

```
    ptr += 4;
    *ptr='\0';
    printf(ptr+1);
    return 0;
}
```

(A) No Output will be printed (B) pal_sir
(C) Guru\0al_sir (D) al_sir

Q.2 The output of the following code:

```
int main()
{
        printf("Gurupal_sir" + 4);
      return 0;
}
```

is_____

Q.3 Output of the code is :

```
#include<stdio.h>
int main()
{
        int a=10;
        printf("%d" + 1);
        return 0;
}
```

(A) Compilation Error (B) Runtime Error (C) 11 (D) d

Q.4 Output of the code is:

```
#include<stdio.h>
int main()
{
    int a={10};
    printf("%d" + 1);
    return 0;
}
```

(A) Compilation Error (B) Runtime Error (C) 11 (D) d

Q.5 Assuming integer size as 4 bytes and address size as 4 bytes,what will be the output of the following code:

```
#include<stdio.h>
#include<string.h>
int main()
{
    char arr[]={'p', 'a', 'n', 'k','a', 'j', '\0'};
    char *ptr="pankaj";
```

```
    char name[]="pankaj";
    printf("%d%d%d",sizeof(arr),sizeof(ptr),sizeof(name));
    return 0;
}
```

(A) 7 6 7 (B) 7 7 6 (C) 7 4 7 (D) 6 6 6

Q.6 What will be the output of the following code ?

```
void main ( )
{
   char  s1[ ] = "Hello";
   char  s2[10];
   char  *s =  "Good Morning";
   char  *q;
   s2 = s1;
   q = s;
   printf("%s", s1);
   printf("%s", q);
}
```

(A) Compilation Error (B) Hello Hello

(C) Hello Good Morning (D) Good Morning Hello

Q.7 What will be the output of the following code ?

```
#include <stdio.h>
char *p1[] = {"Gurupal", "Sir", "Math", "King"};
char **p2[] = {p1+3, p1+2, p1+1, p1};
char ***ptr = p2;
int main()
{
    printf("%s ", **++ptr);
    printf("%s ", *--*++ptr+3);
    printf("%s ", *ptr[-2]+3);
    printf("%s ", ptr[-1][-1]+1);
    return 0;
}
```

(A) Math upal g ir (B) Sir pal g ir

(C) Math pal g ir (D) GarbageValue upal g ir

Q.8 What will be the output of the following code ?

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

```
{
    char my_name[]="pankaj";
    int *ptr;
    int a=20;
    ptr=&a;
    *ptr=*(my_name+1)-a;
    printf("%d",a);
    return 0;
}
```

(A) 0 (B) 77 (C) Compilation error (D) None

Q.9 What will be the output of the following code ?

```
#include<stdio.h>
int main()
{
    char array[7] = "Pankaj", *ptr, i, *ptr1;
    ptr = &array[2];
    ptr1 = ptr + 1;
    *ptr1 = 100;
    ptr--;
     for(i = 1; i <= 5;i++)
    printf("%c", *ptr++);
     return 0;
}
```

(A) Compilation Error (B) ndaj

(C) andaj (D) ankaj

Q.10 Consider the following program:

```
#include<stdio.h>
int main()
{
    char *ptr1="pankaj";
    char *ptr2="pankaj";
    if((ptr1 + 1)==(ptr2 + 1))
    printf("Constant Strings");
    else
    printf("This will execute");
    return 0;
}
```

Output of the program?

(A) Compilation Error (B) Runtime Error

(C) Constant Strings (D) This will execute

Q.11 Consider the following program:

```
#include<stdio.h>
int main()
{
    char arr[]="pankaj";
    char *ptr="pankaj";
    if((arr+1)==(ptr+1))
    printf("Constant Strings");
    else
    printf("This will execute");
    return 0;
}
```

Output of the program?

(A) Compilation Error
(B) Runtime Error
(C) Constant Strings
(D) This will execute

Q.12 What is the output of this program?

```
#include<stdio.h>
int main()
{
    char *ptr;
    char string[] = "How are you?";
    ptr = string;
    ptr += 4;
    printf("%s",ptr);
    return 0;
}
```

(A) How are you? (B) are you? (C) are (D) No

Q.13 Consider the following program:

```
void main ( )
{
    char a[2][4]={'p','a','n','k','a','j'};
    printf("%s",*a);
}
```

(A) C.E
(B) Pankaj followed by garbage characters
(C) Pankaj
(D) R.E

Q.14 Consider the following program:

```
void main ( )
{
    char s[ ]=”GATE ACADEMY”;
    printf(?);
}
```

What would you put in place of "?" to print ACADEMY

(A) s+5 (B) & s[5] (C) "%s", s + 5 (D) "%s", & s[5]

(E) All of these

Q.15 Consider the following program:

```
void main ( )
{
    char s[10] = "Pankaj";
    printf("%s",s[1]−s[4]+s);
}
```

Output of the program?

(A) C.E (B) R.E (C) Pankaj (D) ankaj

Q.16 Consider the following program:

```
#include<stdio.h>
#include<string.h>
int main()
{
        char *ptr="pankaj";
        int len,i;
        len=strlen(ptr);
        for(i=0;i<len;i++)
        printf("%s\n",ptr++);
        return 0;
}
```

The output is _____

Q.17 Consider the following program:

```
#include <stdio.h>
void f(char**);
int main(void)
{
        char *argv[] = { "ab", "cd", "ef", "gh", "ij", "kl" };
        f(argv);
        return 0;
}
void f(char **p)
{
        char *t;
        t = (p += sizeof(int))[-1];
        printf("%s\n", t);
}
```

What is the output of this program on an implementation where integer types occupy 4 bytes?

Q.18 What will be the output of following program ?

```
#include <stdio.h>
int main()
{
        char * str="pankaj";
       printf("%c\n",*&*str);
        return 0;
}
```

(A) Error (B) Pankaj (C) p (D) *p

Q.19 Consider the following program:

```
#include<stdio.h>
int main()
{
        if(strcmp(“pankaj”,”pankaj\0”))
        printf(“pankaj”);
       return 0;
}
```

The output is_____

Q.20 Consider the following program:

```
void f(char * x)
{
       if((*x)!='\0')
       {
            f(x+1);
            f(x+1);
            printf("%c",*x);
       }
}
int main()
{
       f("xyz");
       return 0;
}
```

The output is_____.

Answers

Classroom Practice Questions									
1	D	2	B	3	D	4	C	5	A
6	C	7	B	8	B	9	D	10	C
11	A	12	17	13	3	14	D	15	D
16	C	17	B	18	D	19	Ramesh	20	m
Self-Practice Questions									
1	D	2	pal_sir	3	D	4	D	5	C
6	A	7	A	8	B	9	C	10	C
11	D	12	B	13	C	14	E	15	C
16	*	17	gh	18	C	19	*	20	zzyzzyx

Self-Practice Questions

16. pankaj
ankaj
nkaj
kaj
aj
j

19. No output

❖❖❖❖

6 Structure & Union

Classroom Practice Questions :

Q.1 The following C declarations

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

GATE 2000

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.

Q.2 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 : **GATE 2018**

(A) 0, c (B) 0, $a+2$ (C) '0','$a+2$' (D) '0','c'

Q.3 Which one of the choices given below would be printed when the following program is executed ? **GATE 2006**

```
#include <stdio.h>
struct test
{
        int i;
        char *c;
}st[] = {5, "become", 4, "better", 6, "jungle", 8, "ancestor", 7, "brother"};
main ()
{
        struct test *p = st;
        p += 1;
        ++p -> c;
        printf("%s,", p++ -> c);
        printf("%c,", *++p -> c);
        printf("%d,", p[0].i);
        printf("%s n", p -> c);
}
```

(A) jungle, n, 8, nclastor (B) etter, u, 6, ungle

(C) cetter, k, 6, jungle (D) etter, u, 8, ncestor

Q.4 Consider the following C program:

```
#include<stdio.h>
typedef struct
{
        char*a;
        char*b;
} t;
void f1 (t s);
void f2 (t * p);
main ()
{
        static t s = {"A","B"};
        printf ("%s %s\n", s.a, s.b);
        f1(s);
        printf("%s %s\n", s.a, s.b)
        f2(&s);
}
```

```
void f1 (t s)
{
        s.a = "U";
        s.b = "V"
        printf("%s%s\n", s.a, s.b);
        return;
}
void f2 (t * p)
{
        p → a = "V";
        p → b = "W";
        printf("%s%s\n", p → a , p → b );
        return;
}
```

What is the output generated by the program? **GATE 2004**

(A) AB UV VW VW (B) AB UV AB VW (C) AB UV UV VW (D) AB UV VW UV

Q.5 Consider the following C declaration

```
struct
{
        short s[5];
        union
        {
            float y;
            long z;
        }u;
} t;
```

Assume that objects of the type short, float and long occupy 2 bytes, 4 bytes and 8 bytes, respectively. The memory requirement for variable t, ignoring alignment considerations, is **GATE 2000**

(A) 22 bytes (B) 14 bytes (C) 18 bytes (D) 10 bytes

Q.6 Consider the following C program:

```
#include<stdio.h>
 union my_union{
        int a;
        char b;
        float c;
};
```

```
int main()
{
        union my_union x;
        printf("%d",(int)sizeof(x));
        return 0;
}
```

Assuming size of integer and float is 4 bytes.

The output is _____

Q.7 Consider the following C program:

```
#include<stdio.h>
 struct my
{
         int a;int b;int c;
};
 int main()
{
        struct my x={1,2,3};
         struct my*p;
        p=&x;
        printf("%d",*((int*)p + 2));
 }
```

The output is _____

Q.8 Assuming the size of float and double as 4B, 8B respectively, the output of the code :

```
#include <stdio.h>
int main()
{
        struct sample
        {
                double d1;
                float f1;
        }s1;
        union samp
        {
                double d2;
                 float f2;
        }u1;
        printf("\nSize of Structure : %d ", sizeof(s1));
        printf("\nSize of Union : %d ", sizeof(u1));
        return 0;
}
```

is_____

Q.9 Consider the following C program:

```
#include <stdio.h>
int main()
{
        enum week{ Sunday, Monday, Tuesday, wednesday, Thursday, Friday, Saturday } ;
        printf("\nSunday = %d ", Sunday);
        printf("\nWednesday = %d ", wednesday);
        printf("\nSaturday = %d ", Saturday);
        return 0;
}
```

The output is_____

Q.10 Consider the following C program:

```
#include<stdio.h>
int main()
{
        int x;
        enum { sunday,monday=-1,tuesday,wednesday};
        x=sunday;
        printf("%d",x);
        return 0;
}
```

The output is :

(A) 0 (B) 2 (C) Compilation Error (D) None of these

Self-Practice Questions :

Q.1 Consider the following C program:

```
# include <stdio.h>
# include <string.h>
struct my_struct
{
        char str[10];
};
int main()
{
        struct my_struct s1, s2;
        strcpy(s1.str, "Pankaj");
        s2 = s1;
        s1.str[0] = 'p';
        printf("%s",s2.str);
        return 0;
}
```

The output is_____

Q.2 Which of the following operators can be applied on structure variables?

(A) Equality comparison (==) (B) Assignment (=)

(C) Both of the above (D) None of the above

Q.3 Consider the following C program:

```
#include<stdio.h>
struct my_struct
{
        int x;
        struct my_struct link;
};
int main()
{
        struct my_struct temp;
        temp.x = 6;
        temp.link = temp;
        printf("%d", temp.link.x);
        return 0;
}
```

The output is :

(A) 6 (B) Garbage Value (C) Compilation Error (D) Runtime Error

Q.4 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    struct my_struct
    {
        int a= 10;
        char name[] = "GATE ACADEMY";
    };
    struct my_struct  s1;
    printf("%d",s1.name);
    printf("%d", s1.a);
    return 0;
}
```

(A) GATE ACADEMY 10 (B) Nothing will be displayed

(C) Runtime Error (D) Compilation Error

Q.5 What will be the output of the C program?(Assuming integer size as 2 B)

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

```
{
    union Test
    {
        int i;
        int a[20];
    };
    printf("%d", sizeof(union Test));
    return 0;
}
```

(A) 2 (B) 4 (C) 40 (D) None of the above

Q.6 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    struct st
    {
        int i;
        static int si;
    };
    struct st s = {1, 2};
    printf("%d %d", s.i, s.si);
    return 0;
}
```

(A) 1 2 (B) Linker Error (C) Runtime Error (D) Compilation Error

Q.7 What will be the output of the C program?

```
#include<stdio.h>
int main()
{
    int i = 2;
    enum numbers{num1 = i, num2 , num3}n;
    printf("%d %d %d\n", num1, num2, num3);
}
```

(A) Compilation Error (B) 2 3 4 (C) 1 2 3 (D) None of the above

Q.8 What will be the output of the C program?

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

```
{
        int i, j, k, l;
};
struct num n = {1, 2, 3};
printf("%d %d %d %d", n.i, n.j, n.k, n.l);
}
```

Q.9 Which of the following is true regarding enum in C Language ?

(A) Two enum names can have same value.

(B) If we don't explicitly assign values to enum names ,the compiler by default assigns values starting from 0.

(C) We can assign values to some name in any order.All unassigned names get value as value of previous name plus one.

(D) All of these

Q.10 Which of the following is true regarding enum in C Language ?

(A) The value assigned to enum names must be some integral constant.

(B) All enum constants must be unique in their scope.

(C) Both A and B

(D) None of these

Answers

Classroom Practice Questions									
1	A	2	A	3	B	4	B	5	C
6	4	7	3	8	*	9	*	10	A
Self-Practice Questions									
1	pankaj	2	B	3	C	4	D	5	C
6	D	7	A	8	1 2 3 0	9	D	10	C

Classroom Practice Questions

8. 12
8

9. Sunday = 0
Wednesday = 3
Saturday = 6