

**Question Bank For PG Course**

**Mathematics**

**Paper-4B**

**COMPUTER PROGRAMMING & ITS APPLICATION TO NUMERICAL ANALYSIS : PGMT-IVB**

Question 1

Assuming  $i$  is an integer variable, which of the following C expression/s is/are equivalent to  $(i += 1)$ .

- i)  $i++$
- ii)  $++i$

Question 2

Find below an expression in C where  $a, b, c$  and  $d$  are integer variables.

$$-a - b + -c - +d$$

Supply Parentheses to show how the compiler would interpret the above expression based on the precedence and associativity of the arithmetic operators.

Question 3

Find below an expression in C where  $a, b, c$  and  $d$  are integer variables.

$$-a - b + -c - +d$$

Supply Parentheses to show how the compiler would interpret the above expression based on the precedence and associativity of the arithmetic operators.

Question 4

The main block of two different C-programs are given below.

Program-1 ( main )

```
int sum = 0, x;  
for ( x = 0; x <= 100; x++)  
{  
sum = sum + x;  
}
```

Program-2 ( main )

```
int sum = 0, x;  
for ( x = 0; x <= 100; )  
{  
sum = sum + x;  
x++;  
}
```

Determine whether the above two programs are legal and produce same output or not.

#### Question 5

A two-dimensional integer array m is declared as follows:

```
int m[3][4] = { {1,2,-1},  
{2,3,4,5} } ;
```

Find out the value of m[0][3] and m[2][0].

#### Question 6

What are the different types of storage classes defined in C language?

#### Question 7

Find below a main block of a C program:

```
Program - ( main )
```

```
int i, j;  
for(i=1; i <= 3; i++)  
for(j = 1; j <= 4; j++)  
printf("%d\t%d\n", i, j);
```

If we want to rewrite the above program using goto statement instead of using "for" loop, then write down the main block of the program.

#### Question 8

What is void pointer?

Question 9

If  $i$  is a variable and  $p$  points to  $i$  then which of the following expressions have the same value as  $.i$ ?

- i)  $*p$       ii)  $*\&p$       iii)  $*i$   
iv)  $*\&i$       v)  $\&p$       vi)  $\&*p$

Question 10

Find below a function `print_rev` which takes a positive integer  $n$  and displays all the integers starting from  $n$  up to 1 in decreasing order:

```
void print_rev(int n)
{
    inti ;
    for( i = n ; i > 0 ; i-- )
        printf("%d\n", i ) ;
}
```

Implement the same function using recursion instead of loop?

Question 11

Suppose that  $x$  is a one-dimensional array and  $p$  is a pointer variable. Assuming that the assignment  $p = x$  has just been performed. Based on the above information determine which of the following expressions are true/false?

- i)  $p == x[0]$       ii)  $p == \&x[0]$   
iii)  $*p == x[0]$

Question 12

What is the value of the string *str1* after following statements have been executed?

```
Strcpy( str1, "Linear" );  
Strcpy( str2, "Algebra" );  
if( strcmp ( str1, str2) <0 )  
    strcat( str1, str2 );  
    else  
    strcat ( str1, str2 );
```

Question 13

Evaluate the following postfix expression:

5	3	+	2	*	6	9	7	-	/	-
---	---	---	---	---	---	---	---	---	---	---

Question 14

Which of the following statements are true?

- i)  $5n + 3 = O(n^2)$  [big-oh notation]
- ii)  $5n + 3 = O(n)$  [big-oh notation]
- iii)  $5n + 3 = o(n)$  [little-oh notation]
- iv)  $5n + 3 = \theta(n^2)$  [ $\theta$  notation]

Question 15

Which data structure is mainly used for insertion and deletion of data at the same end?

Question 16

Assuming *i, j, k* are integer variable, following expression is written in C.

```
k = ++i + j ++;
```

Split the above complex expression into multiple simpler expressions.

Question 17

Find below an expression in C where  $a, b, c$  and  $d$  are integer variables.

$a = b + = c - d + --e / -f$

Supply Parentheses to show how the compiler would interpret the above expression based on the precedence and associativity of the arithmetic operators.

### Question 18

Find below few statements in C-language.

```
float x = 18.23 ;
printf ( "%1.1f\n" , x );
printf ( "%-8.3f" , x );
```

Determine the output.

### Question 19

The main block of two different C-programs are given below.

```
Program-1 ( main )
int sum = 0, i=0;
for ( ; i <= 50; i++ )
{
    sum = sum + i;
}
printf ( "%d" , sum );
```

```
Program-2 ( main )
int sum , i;
for ( i = 0 ; i <= 100 ; i++ ; )
{
    sum = sum + i;
}
printf ( "%d" , sum );
```

Are the above programs legal?

### Question 20

A two-dimensional integer array `arr` is declared as follows:

```
int arr[4][4]={ {5,2,-1} ,
                {2,3,4,5},
                {1,7,8,9} };
```

Find out the value of `arr[0][3]` and `arr[3][4]`.

### Question 21



The main block of a C-program to calculate the sum of the first 10 natural number is given below.

```
int n = 10, i = 1, s = 0;
start:
s=s+i;
i++;
if ( i<=n )
goto start ;
else
goto end ;
end:
printf( "Sum=%d" ,s );
```

Replace the goto statement by appropriate "while loop" and Modify the program.

### Question 22

Suppose, a programmer wants to write a C program which displays the digit (1 to 3) in words. The variable  $i$  is used to store the digit given as input. If  $i = 2$  then the program displays "Two". The part of the program is written by the programmer is given below:

```
switch ( i ) {
case 1 : printf("one");
case 2 : printf("two");
case 3 : printf("Three");
}
```

What is the mistake done by the programmer?

### Question 23

A processor needs 4 bytes to allocate an integer. A programmer is executing following C instructions in the processor.

```
int *p ;
p = (int *) malloc (30*sizeof(int)) ;
```

What value will be returned by the pointer if 100 bytes of space is available in memory?

### Question 24

If  $i$  is an integer variable and  $p, q$  are the pointers to integer then which of the following assignments are legal?

- i)  $p = i$     ii)  $p = \&q$     iii)  $*p = *q$   
iv)  $p = q$     v)  $*p = \&i$     vi)  $p = * \&q$

### Question 25

Which data structure is more suitable for adding two polynomials?

### Question 26

What are the values of  $j$  and  $k$  after executing the following statements?

```
# define cube_macro(x) x*x*x
```

```

int cube_fun (int x) { return x * x * x;}
main() {
int i=2 , j , k;
j = cube_fun ( 3+i );
k = cube_macro ( 3+i );
}

```

### Question 27

Assume an array  $a[n]$  contain  $n$  integers

$x_0, x_1, x_2, \dots, x_{n-2}, x_{n-1}$ . Two pointers  $p$  and  $q$  are pointing to the first element ( $x_0$ ) and the last element ( $x_{n-1}$ ) of the array respectively. What are the contents of the array after executing the following while loop?

```

while ( p < q ) {
temp = *p;
*p = *q;
*q = temp;
p = p + 1;
q = q - 1;
}

```

### Question 28

Evaluate the following postfix expression:

15	4	-	2	*	6	9	7	-	/	-
----	---	---	---	---	---	---	---	---	---	---

### Question 29

Assume a processor needs 4 bytes and 8 bytes to allocate an integer and double data type respectively. Two objects are declared in a program and each of them contains two members as follows:

Object A	Object B
<pre> union { int i; double d; } </pre>	<pre> struct { int i; double d; } </pre>

Calculate the size of **object A** and **object B**. (Assume that the compiler leaves no 'holes' between members).

### Question 30

Suppose a programmer has written a C program to compute  $x^y$  using a recursive function where  $x$  and  $y$  both are integers as follows.

```
int power ( int x, int y ) {  
    if (y == 0)  
        return 1 ;  
    else return x*power( x , y-1 );  
}
```

Then he noticed that if  $y$  is an even number then instead of calling the power function recursively  $y$  times he could have called it for  $(y/2)$  times and use the formula  $x^y = x^{y/2} \cdot x^{y/2}$  and make the program more efficient. Modify the above program using the idea.

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