



Question - 1

SCORE: 5 points

Medium

Algorithms

Sorting

Number of swapping operations needed to sort numbers
8,22,7,9,31,19,5,13 in ascending order using bubble sort

- ☐ 11
- ☐ 12
- ☐ 13
- ☒ 14

Question - 2

SCORE: 5 points

QuickSort: Best Performance

Algorithms

Medium

Sorting

Let P be the quicksort program where the larger of the first two distinct elements is chosen as the pivot element. Which of the following input permutations will lead to the best performance of P?

- ☐ [1 2 3 4]
- ☐ [4 3 2 1]
- ☒ [1 3 2 4]
- ☐ [1 3 4 2]

Question - 3

SCORE: 5 points

Algorithms

Medium

Sorting

Is the stability of a sorting algorithm more likely to be a concern while dealing with

1. an array or list of primitive data types
2. an array or list holding objects of composite data types (i.e, classes or structures with multiple fields are present)

Choose the best answer below

- ☐ the stability will matter equally in both cases.
- ☐ the stability is likely to be a concern while dealing with an array or list of primitive data types
- ☒

the stability is likely to be a concern while dealing with an array or list holding objects of composite data types (i.e. classes or structures with multiple fields are present)

☐ None of the above.

Question - 4

SCORE: 5 points

Algorithms

Medium

Sorting

Which of the following sorting methods is stable ?

- ☒ straight insertion sort
- ☐ binary insertion sort
- ☐ shell sort
- ☐ heap

Question - 5

SCORE: 5 points

C

C++

Bitwise Operators

Medium

What is the output of the following program?

```
int main()
{
    int i = 5, j = 2;
    printf("%d %d", i << j, i >> j);
}
```

- ☐ 16 1
- ☒ 20 1
- ☐ 1 20
- ☐ 64 0

Question - 6

SCORE: 5 points

C++

Bitwise Operators

Hard

If $n \& (n - 1) == 0$, what can you say about integer n ?

- ☐ n is an even number.
- ☒ n is a power of 2.
- ☐ n is an odd number.
- ☐ n is not a power of 2.

Question - 7

SCORE: 5 points

C C++ Medium Control Flow

What is the output of the following program?

```
main()
{
    unsigned char ch = 0;
    int count = 0;
    while ( ++ch <= 255 )
        count++;
    printf("%d", count);
}
```

- ☐ 255
- ☐ 256
- ☐ 512
- ☒ no output (infinite loop)

Question - 8

SCORE: 5 points

Return Type

Medium Inheritance C++ Java Object Oriented Programming

What is a covariant return type?

- ☒ The overriding method can have derived type as the return type instead of the base type
- ☐ The overriding method can have base type as the return type instead of the derived type
- ☐ The return type is of the class type Covariant
- ☐ The return type is void

Question - 9

SCORE: 5 points

Easy Big O C C++

What is the asymptotic complexity of function (test_function mentioned below) in terms of n? (Pick the smallest correct answer)

```
int test_function(int n)
{
    int ret = 0;

    for(ret = 0; n > 1; n=n/2)
    {
        ret++;
    }
}
```

```
}  
    return ret;  
}
```

- ☐ $O(n \log n)$
- ☐ $O(n)$
- ☒ $O(\log n)$
- ☐ $O(n^2)$

Question - 10

C: Find the Output

SCORE: 5 points

General Programming

C

C++

Language-Specific

Strings

Standard Library

Consider the following C code snippet:

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

What will the code print?

- ☐ Syntax error
- ☒ mile
- ☐ 5Facsimile
- ☐ Facsimile

Question - 11

SCORE: 5 points

Data Structures

Medium

C

C++

Java

Hash Table

A hash function h maps non-negative **integer** keys to integers in a fixed interval $[0; \dots; N - 1]$.

We call $h(x)$ hash value of x . A hash table consists of:

- the hash function h
- an array (called table) of size N

The idea is to store the key, value pair (k, e) at index $h(k)$. Collisions will be handled using chaining or linear probing.

Which of the following functions is **least suitable** for use as the **hash function** $h(x)$, given that x is a non-negative integer?

$\text{gcd}(x, y)$ represents the Greatest Common Divisor of two positive integers x and y .

- ☐ $h(k) = k \% N$

- ☐ $h(k) = (k * k) \% N$
- ☐ $h(k) = (\gcd(k+1, 2k + 2) + k) \% N$
- ☒ $h(k) = \gcd(k+1, k + 2) \% N$

Question - 12

SCORE: 5 points

C++ : Constructor Initialization

Application Development

General Programming

Medium

C

C++

Core CS

Language-Specific

What will be the output of the following code?

```
class Someclass {
public:
    int x;
public :
    Someclass(int xx) : x(xx) { }
    Someclass(const Someclass& a) { x = a.x ;
x++;}
    void operator =(const Someclass& a1) { x
= a1.x ; x--;}
};
int main( )
{
    Someclass a(4);
    Someclass b = a;
    cout << b.x << endl;
return 0;
}
```

- ☐ 4
- ☐ 3
- ☒ 5
- ☐ Compiler error

Question - 13

SCORE: 5 points

C

C++

Pointers

Arrays

Medium

What is the output of the following program?

```
main()
{
    char str1[] = "Hello";
    char str2[] = "World";
    str1 = str2;
    printf("%s %s", str1, str);
}
```

- ☒ Compiler error
- ☐ Hello World

☐ World Hello☐ World World

Question - 14

SCORE: 5 points

Medium

C++

Control Flow

What is the output of the following program?

```
#include<iostream>
using namespace std;

int main()
{
    int i = 16;
    for (; i; i >= 1)
    {
        if ( i = 5 )
        {
            cout << "world ";
            break;
        }
        cout << i << " ";
    }
}
```

☐ 16 8 world☐ 16 8 world 4 2 1☐ 16 8 world 5 4 2 1☒ world

Question - 15

SCORE: 5 points

C++

Medium

Exception

What is the output of the following program?

```
int main()
{
    int a = 5;
    try
    {
        throw a;
    }
    catch(float b)
    {
        cout << "float" << b << endl;
    }
    return 0;
}
```

☒ Compile time error☐ Compiles successfully, fails at runtime

☐ float5

☐ float5.0