Round 1 (Expert)

1) what is output of following c program

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

A) 25
B) 9
C) 75
D) Compilation Error

2)What is the time complexity of the best sorting algorithm for a nearly sorted array?
A) O(N log N)
B) O(N)
C) $O(N^2)$
D) O(1)

3)

```
int n = 5;
while (n > 0) {
   print(n);
   n = (n & (n - 1));
}
```

A) Prints 5, 4
B) Prints 5, 4, 0
C) Prints all set bits positions in n
D) Prints powers of 2 in n

4) How can you efficiently check if two numbers have opposite signs using bitwise operations?
A) (x ^ y) < 0
B) (x & y) < 0
C) (x | y) < 0
D) x ^ y == 1

5) What is time complexity of following program

```
void func(int n) {
   if (n <= 1) return;
   func(n/2);
   func(n/2);
}
```

A) O(n)
B) O(log n)
C) O(n log n)
D) O(2^log n)

6) What is output of following program

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

A) 1
B) -1
C) 0
D) Compilation error

7) SELECT COUNT(NULL), COUNT(*), COUNT(1) FROM Employees;
A) 0, total rows, total rows
B) NULL, total rows, 1
C) NULL, NULL, total rows
D) 0, NULL, total rows

8) What will be the output of this C++ program?

```
#include <iostream>
using namespace std;
int main() {
   int arr[] = {1, 2, 3, 4, 5};
   int *ptr = (int *)(&arr + 1);
   cout << *(ptr - 1);
}
```

a) 1
b) 5
c) 4
d) Garbage Value

9) What is output of following program

```
#include <stdio.h>
#pragma pack(1)
struct A {
    char a;
    int b;
    char c;
};
#pragma pack()
struct B {
    char a;
    int b;
    char c;
};
int main() {
    printf("%lu", sizeof(struct A));
    printf("%lu", sizeof(struct B));
    return 0;
}
```

A) 6 9
B) 9 12
C) 6 12
D) 6 6

10) What is output of following program

```
#include <stdio.h>
int main() {
    int a = 10, b = 20;
    int *ptr1 = &a, *ptr2 = &b;
    *ptr1 = *ptr1 + *ptr2;
    *ptr2 = *ptr1 - *ptr2;
    *ptr1 = *ptr1 - *ptr2;
    printf("%d %d", a, b);
    return 0;
}
```

A) 10 20
B) 20 10
C) 30 10
D) Compilation error

11) What is output of following program

```
#include <stdio.h>
int main() {
   int a = 10, b = 20, c = 30;
   printf("%d ", a < b ? b < c ? a : b : c);
   return 0;
}
```

A) 10
B) 20
C) 30
D) Compilation error

12) In which case is a B+ tree preferred over a Red-Black tree?
A) When all data needs to be stored in sorted order
B) When disk access needs to be minimized for large datasets
C) When memory usage is the primary concern
D) When we need O(1) lookup time

13) Consider a hash table with n elements and m slots. What is the expected time complexity of a search operation if the hash function uniformly distributes elements and chaining is used for collision resolution?
A) O(1)
B) O(n/m)
C) O(log n)
D) O(n)

14)

```
#include <stdio.h>
int add(int a, int b) { return a + b; }
int sub(int a, int b) { return a - b; }

int main() {
   int (*func_ptr[])(int, int) = {add, sub};
   printf("%d ", func_ptr[0](5, 3));
   printf("%d ", func_ptr[1](5, 3));
   return 0;
}
```

Options:
A) 8 2
B) 5 3
C) 3 5
D) 2 8

15) #include <stdio.h>

```
int main() {
    char *str[] = {"Hello", "World", "Coding"};
    char **ptr = str;
    printf("%c ", *(*(ptr + 1) + 2));
    printf("%s ", *(ptr + 2));
    return 0;
}
```

Options:

A) r Coding

B) l World

C) r World

D) l Coding