

# Mid Sem Examination Algorithms CS 206

Algorithms

Marks : 20

Time : 45 Minutes

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Section \*

B

(1) What will happen when the below snippet is executed? \*

```
void my_recursive_function()
{
    my_recursive_function();
}
int main()
{
    my_recursive_function();
    return 0;
}
```

- ☐ The code will be executed successfully and no output will be generated
- ☐ The code will be executed successfully and random output will be generated
- ☐ Option 3The code will show a compile time error
- ☒ The code will run for some time and stop when the stack overflows

(2) In general, which of the following methods isn't used to find the factorial of a number? \*

- ☐ Recursion
- ☐ Iteration
- ☐ Dynamic programming
- ☒ Non iterative / recursive

(3) The time complexity of the following recursive implementation to find the factorial of a number is \_\_\_\_\_\*

```
int fact(int n)
{
    if(_____)
        return 1;
    return n * fact(n - 1);
}
int main()
{
    int n = 5;
    int ans = fact(n);
    printf("%d",ans);
    return 0;
}
```

- ☐  $O(1)$
- ☒  $O(n)$
- ☐  $O(n \text{ square})$
- ☐  $O(n \text{ cube})$

(4) What is the time complexity of the following recursive im  
the nth fibonacci number? \*

```
int fibo(int n)
{
    if(n == 1)
        return 0;
    else if(n == 2)
        return 1;
    return fibo(n - 1) + fibo(n - 2);
}
int main()
{
    int n = 5;
    int ans = fibo(n);
    printf("%d",ans);
    return 0;
}
```

- ☐  $O(1)$
- ☐  $O(2n)$
- ☐  $O(n \text{ square})$
- ☒  $O(2 \text{ to the power } n)$

(5) What is the time complexity of the following code? \*

```
#include<stdio.h>
void dec_to_bin(int n)
{
    int arr[31],len = 0,i;
    if(n == 0)
    {
        arr[0] = 0;
        len = 1;
    }
    while(n != 0)
    {
        arr[len++] = n % 2;
        n /= 2;
    }
    for(i=len-1; i>=0; i--)
        printf("%d",arr[i]);
}
int main()
{
    int n = 0;
    dec_to_bin(n);
    return 0;
}
```

- ☐  $O(1)$
- ☐  $O(n)$
- ☐  $O(n \text{ square})$
- ☒  $O(\log n)$

(6) What is the time complexity of matrix multiplied recursively by Divide and Conquer Method? \*

- ☐  $O(n)$
- ☒  $O(n^3)$
- ☐  $O(n^2)$
- ☐  $O(n!)$

(7) Which of the following sorting algorithm is NOT stable? \*

- ☒ Selection Sort
- ☐ Brick Sort
- ☐ Bubble Sort
- ☐ Merge Sort

(8) What is the average case time complexity of recursive selection sort? \*

- ☐  $O(n)$
- ☐  $O(n \log n)$
- ☒  $O(n^2)$
- ☐  $O(n^3)$

(9) What is the result of the recurrences which fall under first case of Master's theorem. If the recurrence be given by  $T(n) = aT(n/b) + f(n)$  and  $f(n) = n^c$ ? \*

- ☒  $O(n^{\log a})$
- ☐  $O(n^c \log n)$
- ☐  $O(f(n))$
- ☐  $O(n^2)$

(10) Under what case of Master's theorem will the recurrence relation of binary search fall? \*

- ☐ 1
- ☒ 2
- ☐ 3
- ☐ It can not be solved using master theorem

(11) Solve the following recurrence using Master's theorem.  $T(n) = 4T(n/2) + n^2$  \*

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