



Daffodil International University
Department of Computer Science and Engineering
Faculty of Science and Information Technology
Mid-Term Examination, Semester: Summer 2018
Course Code: CSE 221 **Course Title: Algorithms**
Section: All **Level & Term: L2-T2** **Course Teacher: All**

Time: 1:30 Hours

Total Marks: 25

**Read the questions carefully.*

Answer any Five out of the following Six questions

5*5=25

1. What will be the **Big O** complexity of the following two code snippets:

i)

```
for( i = 1 ; i < n ; i++)  
{  
    for ( j = 1 ; j <= i ; j++)  
    {  
        printf("Algorithm is fun");  
    }  
    printf("\n");  
}
```

2

ii)

```
for( i=1; i<=n; n/=2)  
{  
    for( k=1; k<=n; k+=1)  
    {  
        printf("Time complexity analysis is fun\n");  
    }  
}
```

3

2. a) Suppose you are given with an unsorted list of **n** numbers. To search an element from the list you need to apply **linear search** algorithm. Now write the linear search algorithm. What is the **Big O** complexity of your algorithm? 3

b) Search item **45** using **binary search** algorithm from the following list. Show every single step. 2

A = [333, 145 , 122, 98, 86, 72, 63, 45, 32]

3. a) Sort the following list using **quick sort** algorithm in **ascending** order. Show each necessary step. 3

A = [- 81 -99 2 20 4 -9 12]

b) Does **insertion sort** algorithm follows divide and conquer approach? Why or why not? Explain your answer. 2

4. Suppose you can solve a problem in two different ways having complexity of **O(logn)** and **O(√n)**. Which one is more complex? 2

Write an example problem which you can solve using Greedy algorithm. Give the reasoning, why will you choose Greedy algorithm to solve this problem. 2+1

- 5 a) Suppose you have a file containing the following characters with the corresponding frequency. 1+4

| A | B | C | D | E | F |
|----|----|----|----|---|---|
| 45 | 13 | 12 | 16 | 9 | 5 |

If you encode the file with the following code words what will be the size of your file in terms of required bits?

| A | B | C | D | E | F |
|------|------|------|------|------|------|
| 0000 | 0001 | 0010 | 0011 | 0100 | 0101 |

Now it is possible to encode the file with fewer number of bits. How will you do it? Show the process step by step and finally calculate the new code words for each character.

6. a) Solve the following 0/1 Knapsack Problem using Dynamic Programming. There are four items whose weights and values are given in following arrays. 5

Weight $w[] = \{ 2, 1, 3, 2 \}$

Value $v[] = \{ 12, 10, 20, 15 \}$

Show your equation and find out the optimal knapsack items for weight capacity of 5 units.