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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Midterm Examination, Summer 2026
Course Code: CSE213 , Course Title: Algorithms
Level: 2 Term:1 Batch: 69

Time: 01:30 Hrs **Marks: 25**

Answer ALL the Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	*a)*	Discuss the trade-off between time complexity and space complexity. Provide examples where increasing memory usage can improve execution time.	02	CO1
	b)	Define and compare Big-O, Big-Ω, and Big-Θ notations. Determine the asymptotic complexity of the following function: $\mathbf{f(n) = 3n^2 + 5n + 10}$	03	
2.	*a)*	Analyze the time and space complexity of Quick Sort. Compare its average case performance with Merge Sort.	02	CO2
	b)	Analyze the time complexity of the following code snippet and express it using asymptotic notation:	1.5*2 = 03	

```
#include <stdio.h>
int main () {
   int n;   scanf ("%d", &n) ;
   int i = 1;
   while(i <= n)  {
        int j = 1;
        while( j <= i * i )  {
             printf ( "*" ) ;
             j ++ ;
        }   i ++ ;
} return 0;  }
```

```
#include <stdio.h>
int main () {
   int n;
   scanf ("%d", &n) ;
   for (int i = 1; i < n; i*=3) {
      for (int j = 1; j < n; j*=3)
         printf("Got it\n") ;
      }
   }
  return 0;
}
```

3.	*a)*	Design an algorithm for sorting a given set of N integer elements using Insertion sort algorithm and write pseudocode, also analyze its complexity.	05	CO3
	b)	Given coin denominations {2, 5, 10, 15}, design a Greedy algorithm to make change for an amount 118 . Does the greedy strategy work here! Why?	05	
	c)	Construct a Huffman Tree for the following frequencies: a : 5, c : 9, f : 12, i : 13, l : 16, o : 20, s : 25 and u : 32 Show all steps to send the message "**fallacious**" using the Huffman Tree and compute total cost.	05	