NSBM Green University

BSc (Hons) in Computer Science/Software Engineering/Data Science/MIS

CS106.3: DATA STRUCTURES & ALGORITHMS

Answer Question 1 and any other four **Duration: Three Hours**

This is only a model paper, do not expect the same for the assay type questions. You will have both MCQ and assay type questions.

1. Answer both parts of the question one based on a life lessons and a scenario.
    1. Identify the following algorithms and data structures and their uses in real life.

E.g.: List		List is a collection of items used in shopping carts, reminders, daily tasks, etc.

    2. XYZ Bank is company trying to improve their customer support by improving no of help desks. The company is also serious about elders. Analyze the situation and help the bank to set up proper help desks. Your answer should contain an analysis of the situation, suggested algorithms, illustrations, analysis with numbers, and data structures.

2. Use different types of sorting algorithms including timings, complexities, and illustrations.
    1. Sort the [23, 3, 45, 49, 3, 2] using one of the sorting algorithms.
    2. Illustrate the steps and write pseudo-code for the algorithm.
    3. Estimate the time complexity.

3. Use different types of searching algorithms including timing, complexities, and illustrations.
    1. Compare (look for similarities) and contrast (differences) of different searching techniques.
    2. Write source code for search algorithm.

4. Stacks and queues are common non-linear data structures.
    1. What are the common methods?
    2. How do you implement those?

5. How do you simplify the following expressions?
    1. $9n^2 + 3n$
    2. $n^2 + n.\log n$
    3. $n! + 2^n$
    4. $2000 + 90 + 2$

6. When do you use tree data structure? What are the components, relations, and operations?
    1. What is BST?
    2. How do you traverse a tree, what are the variations?