

Metropolitan University, Sylhet
Department of Computer Science and Engineering
Spring Term Examination Spring – 2021
Program: B.Sc. in CSE **Batch:** 49th, 50th(A+B)
Course: CSE-231:: Algorithm

- ★ Submit a **PDF** file for the assignment containing your answer.
 - Answers can be either handwritten or typed.
 - ★ **Assignment File Name:** 201-115-**ZZZ**_Algo_Assign_Final
 - Replace **ZZZ** with your roll.
 - If you are a retake student, replace the first part of the assignment file corresponding to your roll number.
 - If the filename is not properly formatted you will be penalized with marks.
 - ★ If you have any queries, comment, or inform your CR.
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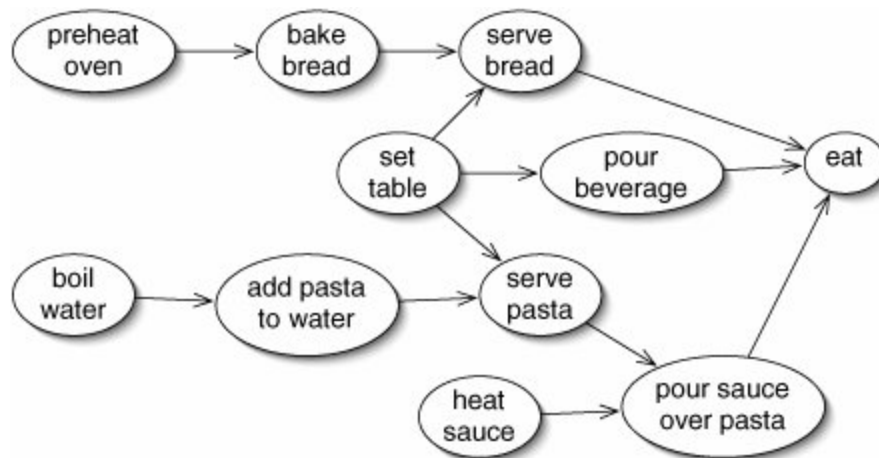
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|--|---|--|---|
| 1. | a | Is $7\log_2(n + 5) = \theta(\log_2(n))$? Find all the constants (c_1, c_2, n_0) and show the required steps. | 5 |
| | b | Write the mathematical definition of o (little oh) and O (big Oh). What are the key differences between them? | 2 |
| | c | Distinguish among weighted, unweighted, directed, and undirected graph. | 2 |
| | d | Does the complexity of algorithms matter? Why? Give your logic. | 1 |
| | | | |
| 2. | a | Write a short note on recursion. | 2 |
| | b | Write two pseudo-code using recursion which will generate permutation n numbers. Show iteration for 3 items (e.g. a, b, c) | 6 |
| | c | What will be the complexity of the algorithm? | 2 |
| | | | |
| 3. | a | The Graph below is Given in the following format (x, y, w) which indicates that there is an edge from x to y ($x \rightarrow y$) which has a weight (cost) of w. | 8 |
| | | | |
| (a, b, 1), (b, c, 2), (a, d, 2), (d, b, 1), (d, e, 2), (c, e, 2), (c, f, 2), (e, f, 1) | | | |

Consider the graph above and find the **Shortest Path** for the graph from **a** to **f**. Which algorithm will you use? Why? Write the pseudo-code of the algorithm and show each step for the algorithm. Find its complexity.

- b Should your algorithm work “just fine” even when there are negative weights of the edges? Give your logic. 2

- 4 a Which data structure is used in DFS and why? 1

- b Consider the image shared below all are different tasks, but there are some dependencies between the tasks about which should be done before that one. Here as **serve bread** has two edges coming towards it that means, before you can start working on **serve bread** (and finish it), you must have to finish the tasks **set table**, and **bake bread**. 4



Your task is to find a learn order of the tasks where all the dependent tasks will be done in such an order that their dependencies are satisfied before accomplishing them.

- c Could you come up with an algorithm for the whole process? What is that? Write the pseudo code of your algorithm. Find the complexity of the algorithm. 5