**DATA STRUCTURE AND ALGORITHM II**

**Assignment 1**

**PART A**

1. Proof that (2,4) tree storing n keys has height Ο (log n). What is the time complexity in this case if n=10? **(4 marks)**
2. What is the property of red black trees? **(5 marks)**
3. What are the criteria you need to consider when choosing the suitable sorting algorithm for your programming? **(5 marks)**
4. Differentiate between merge sort and bubble sort? Please list down minimum of 2 differentiation. **(4 marks)**

**PART B**

* 1. Construct a 2-4 tree for the list S, E, C, U, R, I, T, Y. Use the alphabetical order of the letters and insert them successively starting with the empty tree. **(8 marks)**
  2. Assuming that the probabilities of searching for each of the keys (i.e., the

letters) are the same, find the largest number of key comparisons for successful searches in this tree. **(2 marks)**

* 1. In the language of your choice (preferably using PHYTON), Implement MERGE SORT algorithm to sort the numbers of 10, 59, 8, 24, 41, 34, 99 in ascending order. **(8 marks)**
  2. In the language of your choice (preferably using PHYTON), How you can improve the time efficiency when you can trade off an extra memory? **(8 marks)**
  3. Investigates the time complexity for both algorithms. Which one is consider as better algorithm in terms of time complexity? **(4 marks)**

**What to turn in?**

* Answer for part 1 and 2
* Source code for both sorting algorithms.
* Screenshot of the return value of time complexity for both algorithms.