CS352 – Data Structures and Algorithms

Time: 140 Minutes | Final Exam | Marks: 75

Part 1 (09:15 – 09:30)

Instructions

1. Be honest while solving the paper. It would be better to fail the paper than to pass it by using unfair means.
2. Share your live location on my WhatsApp (Attach->Location->Share Live Location).
3. The exam will have 4 parts. Solve each part in its given time. Solution of each part has to be submitted in its given time.
4. Solve the paper on clean sheets. On each sheet, write sheet number. On the first sheet, write your roll number and name.
5. Take pictures of the solution with flash on.
6. Submit the solution through WhatsApp.
7. Do not delete any message, even if you post something irrelevant.
8. You should have a working mic and camera. You may be asked to turn them on.

Q1. {2+5}

a) Write the sum of first two numbers written in front of your name.

b) Write the first instruction three times and all the other instructions one time by hand on your first sheet. Make sure you understand and follow all the instructions.

01071911002	Nadia Bano	32,72,16,5,27,43,38,21,10
01071911003	Shaista	4,24,26,13,34,30,39,17,21
01071911020	Shafaq Sabeen	30,70,45,60,7,67,22,15,37
01071911025	Adeeba Naveed	55,35,8,69,43,17,34,52,60
01071911026	Adila Amin	18,38,2,4,12,16,8,14,10
01072011001	M. Husnain	52,32,61,44,8,17,79,35,70
01072011002	Ayesha Batool	16,36,8,18,2,12,14,10,4
01072011003	Sohail Mushtaq	26,66,33,13,60,47,6,20,40
01072011004	Areej Amjad	38,78,77,9,19,86,28,57,48
01072011006	M. Salman Ashraf	34,74,19,29,9,59,69,78,39
01072011007	M. Abdul Wahab	6,26,3,22,15,25,28,12,9
01072011008	Laraib Fatima	27,7,36,18,9,63,54,81,72
01072011009	M. Sohail	19,39,5,13,24,2,10,8,16

01072011010	Zainab Iqbal	53,93,46,69,30,7,38,23,61
01072011015	Sana Gul	66,46,25,75,50,41,33,58,8
01072011016	Asad Ejaz	14,34,49,56,28,35,63,42,21
01072011017	Chaudry Abubakar	84,64,47,75,56,28,9,37,18
01072011018	M Ahmad Nawaz Malik	34,74,41,48,55,20,27,6,62
01072011019	Sumbal Mir Dar	7,27,23,70,46,62,39,54,15
01072011020	Farheen Fatima	18,38,12,10,4,16,6,2,14
01072011021	Khansa Khalil	57,97,14,21,50,42,7,64,35
01072011024	Daniyal Ahmed	10,30,26,20,3,31,13,23,6
01072011026	M. Shahid Aslam	6,26,16,4,2,8,12,10,14
01072011028	Aiza Noor	17,37,2,5,10,15,20,23,12
01072011029	Sabeeha Batool	16,36,7,2,14,12,19,21,9
01072011030	Sumbal Batool	51,91,22,39,11,5,45,34,17

Part 2 (09:30 – 10:15)

Q2. How would an empty hash table look like after inserting the first five values given in Q1 in the given order using **open addressing**, **multiplication method**, and **double hashing** with A_1=0.7, A_2 = 0.3, and m = 11? No code is required for this question. {8}

Q3. No code is required for this question. {10+5+8=23}

a) How would an empty AVL tree look like after inserting the values given in Q1 in the given order? Clearly show all the steps without any cutting.
b) For the AVL drawn in part (a), show the sequence of nodes traversed using post order traversal.
c) How would the tree in part (a) look like after deleting the root node? Note: you would need to check the balance of each node on the path from the deleted node towards the root node and do appropriate rotations if required.

Part 3 (10:15 – 11:15)

Q4. For the values given in Q1, write **client code** for the following: {6x4=24}

a) Insert the values in a stack **S**, one by one (without using a loop).
b) Using a loop, pop all the values from the stack **S** in part (a) and insert them into a BST **B**.
c) For the BST **B** in part (b), traverse it using level order traversal and insert the values in a priority queue **PQ**.
d) For the priority queue **PQ** in part (c), remove all the values from the priority queue and insert them in a queue **Q**.

Q5. Suppose that mobile phone records are stored in a file **data.bin**, write **client code** for the following: {2+4+7=13}

a) At the start of the program, if the file **data.bin** does not exist, create it.
b) Read all the records from **data.bin** and store them in an STL list **L**.
c) Write a function **find** which takes the list **L** in part (b) and a value **m** (of type mobile phone) as parameters and returns true if the phone **m** is found in the list and false otherwise.

Part 4 (11:15 – 11:35)

- Complete any incomplete questions and send them again.
- Do not delete the old solutions!