

Student ID:

Student Name:

Part A: Hash Table Definitions (Conceptual Understanding)

Q1. Define “collision” in the context of hash tables.

A1:

Q2. What is a “bucket” in a hash table?

A2:

Q3. Define “load factor (α)” and explain why it affects performance.

A3:

Q4. What is “primary clustering,” and which probing method suffers from it?

A4:

Q5. What is “secondary clustering,” and how is it different from primary clustering?

A5:

Q6. Briefly explain the difference between:

- Open addressing
- Separate chaining

A6:

Part B: Hash Function Calculation (Collision & Pattern Observation)

Show your steps clearly.

Hash Function 1 — Division Method

$$h_1(k) = k \bmod 10$$

Hash Function 2 — Folding Method

Split key into two-digit chunks and sum the chunks.

$$h_2(k) = (\text{sum of 2-digit groups}) \bmod 11$$

Example:

Key = 8429 → groups: 84 + 29 → 113 → 113 mod 11 = 3

Q7. (Compute using Hash Function 1)

Given keys: 27, 37, 47, 57, 67

Compute their hash values using:

$$h_1(k) = k \bmod 10$$

A7:

Q8. (Identify collision pattern)

From your results in Q1:

- What pattern do you observe?
- Explain why these keys collide.

A8:

Q9. (Compute using Hash Function 2)

Compute $h_2(k)$ for: 1234, 9217, 4519, 9902

A9:

Q10. (Compare distribution)

- Which hash function (h_1 or h_2) produced more collisions for the input set?
- Which seems to spread keys more evenly?
- Provide 1–2 sentences of explanation.

A10: