Question 4. *(15 marks)*

Use the hash function H(key) key mod 10 to store the sequence of integers: 4371, 1323, 6173, 4199, 4344, 9679, 1989 in a hash table of TableSize = 10. Show the resulting hash table when using:
(a) Linear rehashing
(b) External chaining
(c) Coalesced chaining with cellar size of five and hash function H(key) = key mod 5.

(a) Using Linear rehashing:

Insert Key 4371 : H(4371) = 4371 mod 10 = 1   **Probes = 1**

E	4371	E	E	E	E	E	E	E	E
0	1	2	3	4	5	6	7	8	9

Insert Key 1323 : H(1323) = 1323 mod 10 = 3   **Probes = 1**

E	4371	E	1323	E	E	E	E	E	E
0	1	2	3	4	5	6	7	8	9

Insert Key 6173 : H(6173) = 6173 mod 10 = 3 Collision in index 3.

Rehash = p + c mod tableSize = 3 + 1 mod 10 = 4.   **Probes = 2**

E	4371	E	1323	6173	E	E	E	E	E
0	1	2	3	4	5	6	7	8	9

Insert Key 4199 : H(4199) = 4199 mod 10 = 9.   **Probes = 1**

E	4371	E	1323	6173	E	E	E	E	4199
0	1	2	3	4	5	6	7	8	9

Insert Key 4344 : H(4344) = 4344 mod 10 = 4 Collision in index 4.

Rehash = p + c mod tableSize = 4 + 1 mod 10 = 5.   **Probes = 2**

E	4371	E	1323	6173	4344	E	E	E	4199
0	1	2	3	4	5	6	7	8	9

Insert Key 9679 : H(9679) = 9679 mod 10 = 9 Collision in index 9.

Rehash = p + c mod tableSize = 9 + 1 mod 10 = 0.   **Probes = 2**

9679	4371	E	1323	6173	4344	E	E	E	4199
0	1	2	3	4	5	6	7	8	9

Insert Key 1989 : H(1989) = 1989 mod 10 = 9   Collision in index 9.

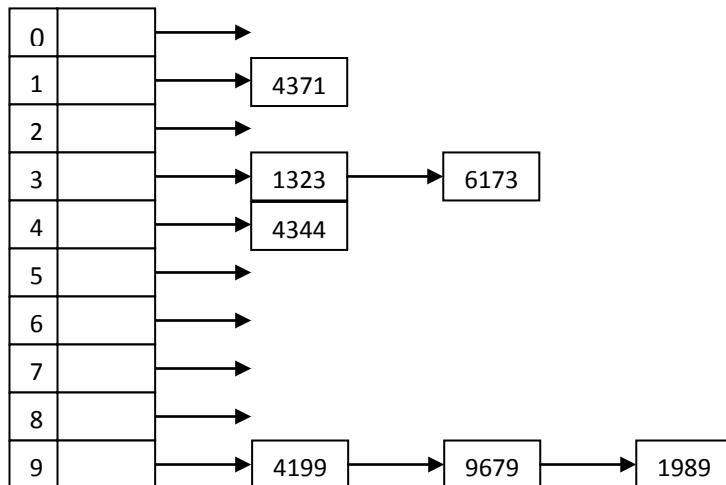**Rehash = p + c mod tableSize = 9 + 1 mod 10 = 0 Collision in index 0.**

Rehash = p + c mod tableSize = 0 + 1 mod 10 = 1 Collision in index 1.

Rehash = p + c mod tableSize = 1 + 1 mod 10 = 2.   Probes = 4

9679	4371	1989	1323	6173	4344	E	E	E	4199
0	1	2	3	4	5	6	7	8	9

(b) **Using External chaining rehashing:**

(c) Coalesced chaining with cellar size of five and hash function **H(key) = key mod 5**.

4371

0	
1	4371
2	
3	
4	
5	
6	
7	
8	
9	**epla**

Cellar

1323

0	
1	4371
2	
3	1323
4	
5	
6	
7	
8	
9	**epla**

Cellar

6173

0	
1	4371
2	
3	1323
4	
5	
6	
7	
8	**epla**
9	6173

Cellar

4199

0	
1	4371
2	
3	1323
4	4199
5	
6	
7	
8	**epla**
9	6173

Cellar

4344

0	
1	4371
2	
3	1323
4	4199
5	
6	
7	**epla**
8	4344
9	6173

Cellar

9679

0	
1	4371
2	
3	1323
4	4199
5	
6	**epla**
7	9679
8	4344
9	6173

Cellar

1989

0	
1	4371
2	
3	1323
4	4199
5	**epla**
6	1989
7	9679
8	4344
9	6173

Cellar