

1. Close book
 2. Be sure to put your name and student ID on your answer sheet
 3. Date & Time: 6/13, 16:10 – 17:50
-

1. (10%) Database

Translate the following SQL statement into a sequence of SELECT, PROJECT, and JOIN operations.

```
select ASSIGNMENT.StartDate
from ASSIGNMENT, EMPLOYEE
where ASSIGNMENT.EmpId = EMPLOYEE.EmpId
and EMPLOYEE.Name = "Joe.E. Baker"
```

2. (10%) Sorting

Please use insertion sort, step by step, to sort the following sequence: 78, 65, 54, 48, 34, 23, 12, 9, 3, 1.

3. (10%) Tree traverse

Suppose that you are given the preorder sequence 1 2 3 4 5 6 7 8 9, and the inorder sequence 2 3 1 5 4 7 8 6 9 of the same binary tree. Can you uniquely determine the corresponding postorder sequence? Yes or no. If yes, what is it? Otherwise, please explain the reason.

4. (20%) Hashing

- a. (10%) A file using K as the hash key includes records with the following values: 15, 26, 25, 64, 31, 54, 32, 21, 45, 67, 86, 35, 89, 56, 43. Please load the records of the file into a hash file using the hash function $h(K)=K \bmod 20$ Using linear probing technique to handle collision.
- b. (10%) If we divided the storage area for a hashed file into 41 buckets that can each hold exactly one record, we expect at least one section to overflow after only eight records are stored. On the other hand, if we combine the same storage area into one bucket that can hold 41 records before overflow occurs. What keeps us from deciding to implement hashed files using this latter configuration?

5. (20%) Linked list

- a. (10%) Design a procedure that reverses the order of a linked list.
- b. (10%) Sometimes a single linked list is given two different orders by

attaching two pointers to each entry rather than one. Fill in the table below so that by following the first pointer after each letter, one finds the letters in alphabetical order. What values belong in the head pointer of each of the two lists represented?

Address	Contents
60	O
61	
62	
63	C
64	
65	
66	A
67	
68	
69	L
70	
71	
72	R
73	
74	

6. (20%) Algorithm

- a. (10%) What sequence of numbers is printed by the following algorithm if it is started with input values 0 and 1?

```

procedure MysteryWrite (Last, Current)
if (Current < 100) then
{
    print the value assigned to Current;
    assign Temp the value of Current + Last;
    apply MysteryWrite to the values Current and Temp;
}

```

- b. Modify the procedure MysteryWrite in the preceding problem so that the values are printed in reverse order.

7. (10%) Networks

Token-based protocols can be used to control the right to transmit in networks that do not have a ring configuration. Design a token-based protocol to control the right to transmit in a LAN with a bus configuration.