North South University
Department of Computer Science and Engineering
Course Title: CSE311-Database System
Final Section 1

Full Marks: 40

Instructions: The exam is an open-book one. You have 1hour 15 minutes to complete the Final. You should clearly and concisely show all relevant work There are 4 questions in this test. Answer everything neatly in your exam sheet and then take pictures of all the answers. Finally make a pdf and submit them. Write your name and ID neatly onto your answer sheet.

Q1. Normalisation [10 marks]
The Super Electronics Invoice shown below displays the details of an invoice for the client Alice Paul.

Super Electronics
INVOICE

Client Number: C3178713
Client Name: Alice Paul
Client Address: 43 High Street, Caulfield, VIC 3162
Client Phone: 0411 245 718

Invoice No.: 132
Invoice Date: 02/11/2018

ItemID	Item Name	Purchase Price	Expected Delivery Date	Quantity	Cost
316772	Soniq S55UV16B 55"	499.00	2 weeks	1	499.00
452550	Microsoft Surface Pro	1198.00	1-3 weeks	1	1198.00
483041	Delonghi Digital Coffee	299.00	Same Day	2	598.00
				SUB TOTAL:	**$ 2295.00**
				DELIVERY:	**$145.00**
				ORDER TOTAL:	**$2440.00**

Represent this form in UNF. In creating your representation you should note that Super Electronics wish to treat the client name, address and phone as simple attributes.
Convert your UNF to first normal form (1NF) and then continue the normalisation to third normal form (3NF). At each normal form show the appropriate dependencies for that normal form, if there are none write "No Dependencies"
Do not add new attributes during the normalisation. Clearly write the relations in each step from the unormalised form (UNF) to the third normal form (3NF). Clearly, indicate primary keys on all relations from 1NF onwards.

Q2 SQL MCQ [5*2=10 marks]

Read the following description of a database system, and then answer Subquestions 1 through 2.

The Lucky Dog Grooming Parlor is a pet care shop that provides full pet-styling salon services with several facilities, especially for dogs. The shop maintains information about each pet in a table named PetTable with attributes that include each dog's ID, name, breed, pet owner's name, and the balance due on services. The table structure is as follows:

PetTable (DogID, DogName, Breed, OwnerName, BalanceDue)

Subquestion 1

From the answer group below, select the correct answer to be inserted in the blank [ ] in the following SQL statement.

Some pet owners own more than one dog. The shop manager wants to generate a report that displays a list of pet owners who own more than one dog. For this purpose, the SQL statement "SQL1" is created.

```
-- SQL statement "SQL1"
SELECT OwnerName, DogName, Breed, BalanceDue
FROM PetTable
WHERE [ A ]
ORDER BY OwnerName
```

An example of the report created by "SQL1" is as follows:

OwnerName	DogName	Breed	BalanceDue
Henry Chauncey	Buddy	Great Dane	1000
Henry Chauncey	Abe	Bulldog	300
Mike Barz	Baxter	Boxer	1000
Mike Barz	Fluffy	Poodle	0
Mike Barz	Love	Poodle	100

Answer group for A

a) COUNT(OwnerName)>1
b) DogID IN (SELECT DogID FROM PetTable HAVING(COUNT(DogID)>1))
c) DogID IN (SELECT DogID FROM PetTable HAVING(COUNT(OwnerName)>1))
d) HAVING(COUNT(DogID)>1)
e) OwnerName IN (SELECT OwnerName FROM PetTable
GROUP BY OwnerName HAVING(COUNT(OwnerName)>1))

Subquestion 2

From the answer group below, select the correct answer to be inserted in each blank [ ] in the following SQL statement. If needed, select the same answer twice or more.

The Lucky Dog Grooming Parlor also wants to maintain information about each pet owner in a table named OwnerTable with attributes that include each owner's ID, name, address, township, and telephone number. The table structure is as follows:

OwnerTable (OwnerID, OwnerName, Address, Township, TelephoneNo)

To obtain a relationship between OwnerTable and PetTable, the attribute OwnerName in PetTable is replaced by the attribute OwnerID. Consequently, the table structure of PetTable is as follows:

PetTable (DogID, DogName, Breed, OwnerID, BalanceDue)

The shop manager wants to give 10% discount on the current balance due for pet owners who come from any township different from the "Wild Rose" township, which is where the shop is located. For this purpose, the SQL statement "SQL2" is created.

```
-- SQL statement "SQL2"
UPDATE [ B ]
   SET BalanceDue = BalanceDue – (BalanceDue * 0.1)
   WHERE [ C ]  IN (SELECT [ D ]
                    FROM   [ E ]
                    WHERE Township <> 'Wild Rose')
```

The following table shows how the balance due is updated by "SQL2".

DogID	DogName	Breed	BalanceDue before update	BalanceDue after update	Township
1	Buddy	Great Dane	1000	1000	Wild Rose
2	Abe	Bulldog	300	300	Wild Rose
3	Acridus	Great Dane	1500	1350	Schaumburg
4	Bam Bam	Bulldog	1000	900	Schaumburg
5	Baxter	Boxer	1000	900	Dubuque
6	Fluffy	Poodle	0	0	Dubuque
7	Love	Poodle	100	90	Dubuque

Answer group for B through E
a) BalanceDue b) DogID c) OwnerID
d) OwnerTable e) PetTable f) Township

Q3. Relational Algebra [12 Marks]

a. Consider the following SQL query-

select U.userID, U.Name, UE.gradYear
from Users U, UserEducation UE
where U.sex=‘‘Male" and UE.userID=U.userID and UE.university_Name=‘‘NSU";

Now, translate this query into an equivalent Relational Algebra expression. [4]

b. Consider the following relational database, where the primary keys are underlined. Give an expression in the *relational algebra* to answer the queries.

Passengers (*PId*, PassengerName, Address, Age)
Reservations (*PId, FlightNum*, SeatNo, Class, Fair)
Flights (*FlightNum*, DepartCity, DestinationCity, DepartureTime, ArrivalTime, MinutesLate)

i) Find out the names of passengers and their flight number who had a reservation on a flight from Bangladesh to Canada -that departs at 6.00 pm. [4]

ii) Find out the passenger Address whose seat number is 6A and the Destination city for whose flight is NewYork. [4]

Q4. SQL Query Writing [8 Marks]

Following tables are given to you-
employee (ename, street, city)
works (ename, cname, salary, jdate)
company (cname, city)
manages (ename, mname)

Now write down the following two queries in SQL

a) Find the names of all employees who earn lesser than every employee of NCC Bank and whose manager name is Mr Shafiq [4]
b) Find out the employee details who live in the same city as the company for which the work and whose joining date is after 01.01.2020. [4]