Quiz B

COMP2411 Database Systems
Fall 2023

Name: _____ Student ID: _____

Date: _____

This is a closed book quiz with 15 MC questions and 2 short questions. You have 60 minutes to complete this quiz. For the MC questions, provide your answer inside the brackets at the end of each question. If you think there is more than one answer to a question, select the best one. Each MC question carries 2 marks and the 2 short questions carry 20 marks in total.

The following relation BookStore is used in questions 1- 4.

BookStore								
AuthorID	**AuthorName**	**AuthorPhone**	**BookNo**	**Booktitle**	**Publisher**	**Edition**	**Price**	**PublisherPlace**
101	Mary	2017	0001	A	NB	1	100	HK
101	Mary	2017	0004	B	PH	1	40	Kowloon
101	Mary	2017	0004	B	NB	2	80	HK
103	John	2017	0003	V	PH	1	50	Kowloon
103	John	2017	0012	Y	MG	1	45	NT
104	Mary	4029	0005	C	MG	1	50	NT
104	Mary	4029	0005	C	MG	2	60	NT
106	David	3111	0002	F	PH	1	30	Kowloon
106	David	3111	0018	W	NB	1	80	HK
107	Joan	2168	0032	P	NB	1	100	HK
108	Stephen	3145	0023	R	PH	1	75	Kowloon

1. Which of the following SQL commands will return the AuthorID who have published at least one book? (___)

(a) SELECT AuthorID
FROM BookStore
HAVING count(*)=1

(b) SELECT AuthorID
FROM BookStore
WHERE count(*) =1

(c) SELECT AuthorID
FROM BookStore

(d) SELECT AuthorID
FROM BookStore
HAVING count(*) = 1
GROUP BY AuthorName

(e) None of the above

2. Which of the following SQL commands will return the AuthorName of authors who have the same phone number with another author? (___)

(a) SELECT AuthorName
FROM BookStore
WHERE COUNT(AuthorPhone) > 1

(b) SELECT A.AuthorName
FROM BookStore A, BookStore B
WHERE A.AuthorPhone=B.AuthorPhone AND
A.AuthorID <> B.AuthorID

(c) SELECT AuthorName
FROM BookStore
GROUP BY AuthorPhone

(d) SELECT AuthorName
FROM BookStore
WHERE AuthorPhone IN (SELECT * FROM BookStore)

(e) None of the above

3. Which of the following SQL commands will return the publisher of books written by Mary and prices less than 50? (___)

(a) SELECT DISTINCT Publisher
FROM BookStore A
WHERE A.AuthorName like "%Mary%" AND
A.Price < 50

(b) SELECT DISTINCT Publisher
FROM BookStore A
WHERE A.AuthorName="%Mary%" AND
A.Price > 50

(c) SELECT DISTINCT Publisher
FROM BookStore A
WHERE A.AuthorName like "%Mary%" AND
Count(Price) < 50

(d) SELECT DISTINCT Publisher
FROM BookStore A
WHERE AuthorName IN (SELECT * FROM BookStore B
B.Price>50 AND B.AuthorName like "%Mary%")

(e) None of the above

4. Which of the following SQL commands will return the highest price of books with the same title? (___)

(a) SELECT Booktitle, price
FROM BookStore
WHERE MAX(price)

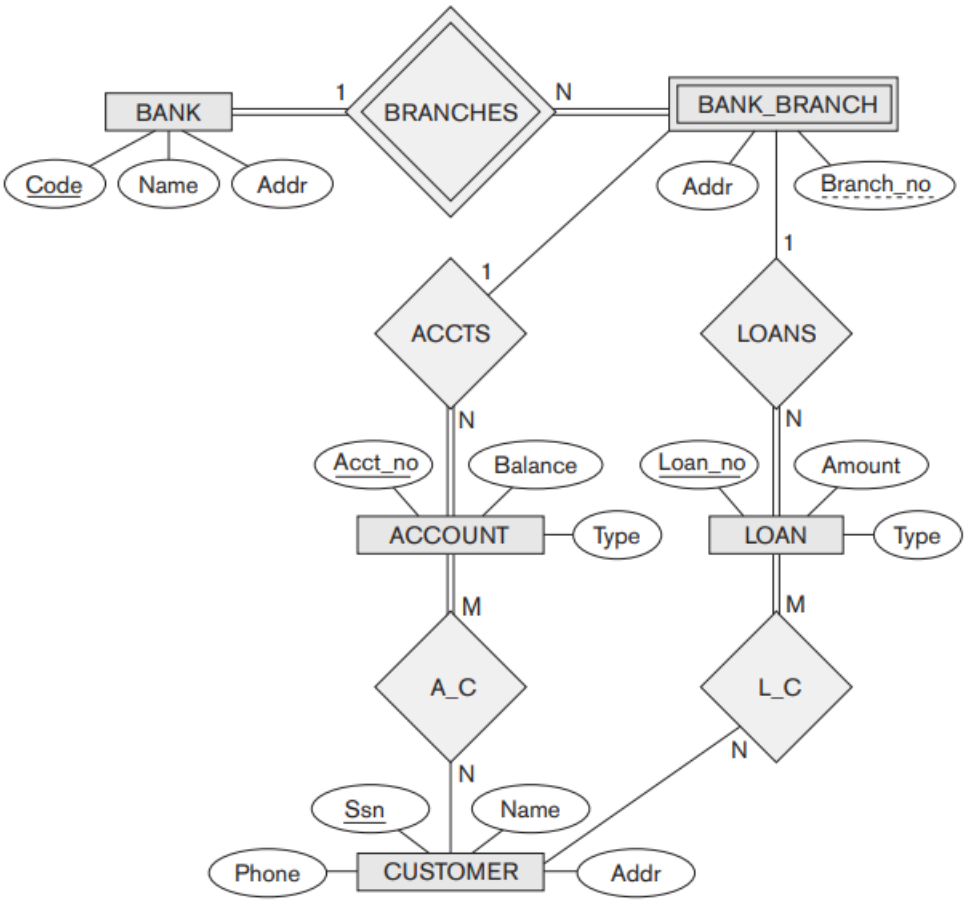
(b) SELECT Booktitle, max(price)
FROM BookStore

(c) SELECT Booktitle, max(price)
FROM BookStore
GROUP BY price

(d) SELECT Booktitle, max(price)
FROM BookStore
GROUP BY Booktitle

(e) None of the above

The ERD below is used for Question 5-10.



5. In the above ERD, which entity is a weak entity? (___)

(a) BANK
(b) ACCTS
(c) BANK_BRANCH
(d) BRANCHES
(e) ACCOUNT

6. What is a suitable data type for the 'Code' attribute? (___)

(a) DECIMAL
(b) CHAR
(c) INTEGER
(d) BOOLEAN
(e) DATE

7. How many 1-N relationships in the above ERD? (___)

(a) 3
(b) 4
(c) 5
(d) 6
(e) 7

8. Which of the following statements is FALSE? (___)

(a) A bank has several branches.
(b) Every customer has at least one account.
(c) A bank branch may have some loans.
(d) Some customers share the same account.
(e) None of the above

9. In the above ERD, when *L_C* is transformed to a table, what is the number of attributes inside? (___)

(a) 1
(b) 2
(c) 3
(d) 4
(e) None of the above

10. How many foreign keys after the tables generated from the ERD above? (___)

(a) 4
(b) 5
(c) 6
(d) 7
(e) None of the above

11. Logical data independence can be defined as _____. (___)

(a) The capacity to change the conceptual schema without having to change the external schema.
(b) The capacity to change the external schema without having to change the physical schema.
(c) The capacity to change the physical schema without having to change external schema or application programs
(d) All of the above
(e) None of the above

12. An external schema is _____. (___)

(a) A collection of views like relations.
(b) A collection of files.
(c) A physical schema.
(d) A collection of relations stored in the database.
(e) None of the above.

13. The HAVING clause does which of the following? (___)

(a) Acts like a WHERE clause but is used for groups rather than rows.
(b) Acts like a WHERE clause but is used for rows rather than columns.
(c) Acts like a WHERE clause but is used for columns rather than groups.
(d) Acts EXACTLY like a WHERE clause.
(e) None of the above

14. An entity (E) has 5 attributes and 3 of them form the composite primary key. The entity has a recursive 1-to-many relationship. How many attributes should there be after transforming the entity (E) to the corresponding table? (___)

(a) 4
(b) 5
(c) 6
(d) 7
(e) None of the above

15. You have run an SQL statement that asked the DBMS to display data in a table named USER_TABLES. The results include columns of data labeled "TableName," "NumberOfColumns" and "PrimaryKey." You are looking at _____. (___)

(a) user data.
(b) metadata
(c) a report
(d) indexes
(e) None of the above

Question 16 (10 marks)

A database schema is given below.

EMPLOYEES(ENO, FNAME, M, INIT, LNAME, BYEAR, SEX, SALARY,DNO)
DEPARTMENT(DNO, DNAME, MGR_ENO, ENO)

PLOC are referring to names of cities, such as Hong Kong, Shanghai, etc. DYEAR is in the format of YYYY (integer).

a) Write an SQL statement that retrieves the first name and birthyear of all employees born in the 50s. [2 marks]

Ans.

```
SELECT fname, byear
FROM employees
WHERE 1950<= byear AND byear <=1959
```

b) Write a relational algebra expression that do the same as (a). [1 marks]

$\Pi_{fname, byear}(\sigma_{1950 <= byear \wedge byear <=1959}(employees))$

c) Write a SQL statement to provide the department number for departments only have male employees. [2 marks]

Ans.

```
SELECT dno
FROM department
WHERE dno not IN (SELECT distinct dno FROM employees where sex = 'f')
```

d) Write a relational algebra expression that do the same as (c). [2 marks]

$\Pi_{dno}(department) - \Pi_{dno}(\sigma_{sex='f'}(employees))$

e) For each employee, retrieve the employee number, the department number, and the maximal salary in this department. [3 marks]

Ans.

```
SELECT eno, dno, att
FROM employees, (SELECT dno as dno1, MAX (salary) as att
                 FROM employees
                 GROUP BY dno)
WHERE dno = dno1
```

Question 17 (10 marks)

You are asked to design a database schema for V-Health chain of pharmacies with the information below:

- Patients are identified by HKID, and their names, addresses, and ages must be recorded.
- Doctors are identified by HKID. For each doctor, the name, specialty, and years of experience must be recorded.
- Each pharmaceutical company is identified by name and has a phone number.
- For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
- Each pharmacy has a name, address, and phone number.
- Every patient has a primary physician. Every doctor has at least one patient.
- Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
- Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors.
- Each prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
- Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
- Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Design an ERD for the description including entities, their primary keys, relationships, and cardinalities. If the above requirements are not complete, provide yours and state the reasons.

Suggested Answer.

*Correct entities and attributes **(4 marks)**, relationships **(4 marks)**, primary keys **(2 marks).** There are 5 entities (patient, doctor, pharmacy, drug and pharm_company), relationships (patients with doctors, patient with a primary doctor, patient prescriptions with drugs, drugs with pharmacies, pharm_company with drugs).*

Provide your ERD in this page. _____

- END OF QUIZ -