## King Fahd University of Petroleum and Minerals

Information and Computer Science Department

ICS 361: Database Systems

Summer Semester 2015 - 2016

## Midterm

Date: Aug. 09, 2016; Time: 19:30 - 21:30

ID:	
Name:	

	Grades	
Section	Max	Scored
Α	10	
В	4	
С	8	
D	14	
Ε	8	
F	6	
TOTAL	50	

- Switch off your mobile phones
- Don't open until you are told to do so.

# A. [10 pts] Match each statement in Table 2 with its corresponding term in Table 1 and then write the number of the corresponding term in column 3 of Table 2.

#### Table 1: Terms

1.	Database	2. DBMS	3. Meta-data	4. Transaction
5.	Referential Integrity	6. Data model	7. Extension	8. 3-Tier
9.	Degree	10. Cardinality	11. Schema-based Constraints	12. Super key
13.	Database state	14. Key	15. Primary key	16. DBA

#### **Table 2: Statements**

#	Statement	Term #
1	Collection of concepts that describe the structure, operations and constraints of a database	
2	A composite attributes with uniqueness property	
3	A person responsible for authorizing access to the database	
4	Collection of related data	
5	Number of attributes in a relation	
6	Changes when a data is updated or deleted or inserted in a database	
7	Total number of rows in a relation	
8	Collection of programs which enables users to create and maintain a database	
9	Database definition stored by the DBMS in the form of a database catalog or dictionary	
10	Specified between two relations to maintain the consistency among tuples of the two relations	

**B. [4 pts]** Assume that you have been asked to develop a database application like blackboard, where students can access all the required material through the Internet. Would you use a centralized architecture, a 2-tier architecture or a 3-tier architecture? Clearly justify your choice (the reason for choosing that architecture and the reason(s) for not choosing the other two architectures).

### C. [8 pts] Answer the following True/False questions

#	Statement	T or F
1	Any key is a super key but not any super key is a key	
2	We can have more than one candidate keys in a table	
3	A column that is referenced by a foreign key must be a candidate key	
4	A foreign key cannot be NULL	
5	All candidate keys are superkeys	
6	A primary key value cannot be null.	
7	Duplicate rows are allowed in a table but not in a relation	
8	A proper subset of the columns in a super key cannot be a super key	

## D. [14 pts] Answer all of the following questions.

1. **[6 pts]** Each empty cell in the following table corresponds to a database operator and a constraint. Mark each cell with a **tick** if its database operator can possibly violate its constraint.

<b>Constraint\Operator</b>	Query (Search)	Insert	Delete	Update(Modify)
Domain				
key		/		
Primary key				
Referential integrity				
Not NULL				
Entity integrity				

- 2. [2 pts] Use the tables and statements in Figure 1 of Page 7 to answer the following questions.
  - a. What is the cardinality of T1?
  - b. What is the degree of T2?
- 3. [4 pts] What is the state of T1 and T2 after the execution of S1, if the default is:
  - a. Cascade delete?

b. Nullify?

- 4. [2 pts] Write all the keys in T1 which are not super keys.

E. [8 pts] Use the entities shown in Page 7 to convert the following conceptual designs to logical designs.



b)



c)



d)



## F. [6 pts] A small hotel owner wants a database application for the room reservation system. The following are the requirements.

The small hotel has 2 types of rooms, namely, Type A and Type B. Each room has 1 or 2 or 3 beds. There are 4 types of hotel seasons, namely, very high, high, low, and very low. In one year it is possible to have a number of each season. The price of a room per day depends on the room type, the number of its beds, and the season. A customer can reserve a number of rooms for a number of days. Each customer must give his, name, ID number, phone numbers, and address in order to book a room. Draw the DB conceptual design using the ER model.

### **<u>Figure 1</u>**: Tables T1 and T2

<u>C1</u>	C2	C3	C4
1	2	3	4
2	3	4	5
3	4	5	6
T1			

#### Assume:

- All columns are of type NUMBER
- T1.C1 is a primary key
- T2.C1 is a foreign key and references T1.C1.

### S1: DELETE FROM T1 WHERE c1 = 2;

(S1 is an SQL statement and is deleting the second row of T1.)

**Figure 2: Entities** 

