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| **Benha University** |  | **Faculty of Computers & Informatics** |
| **2nd Term (May 2018) Final Exam**  **Class: 3rd** Year Students  **Subject: Database Management Systems**  **Course Code: DBA 372** |  | **Date**: 31/5/2018  **Time:** 3 Hours  **Examiner(s):** Dr. Walaa Medhat |

**Answer the following questions:**

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| **Question No. 1 [10 Marks]** |

1. a) Define the following terms: *attribute, domain, relation cardinality,* and *relation degree.*
2. b) What is the objective of Normalization?
3. c) What is referential integrity?
4. d) What is the purpose of physical database design?
5. e) What does inheritance between entities means?

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| **Question No. 2 [15 Marks]** |

Consider the insurance database, where the primary keys are underlined. Construct the following SQL queries for this relational database.

Person (driver id, name, address)

Car (license, model, year)

Accident (report number, date, location)

Owns (driver id, license)

Participated (driver id, car, report number, damage amount)

Use SQL to write the following queries:

1. Find the total number of people who owned cars that were involved in accidents in 1989.
2. Add a new accident to the database; assume any values for required attributes.
3. Delete the Mazda belonging to “John Smith”.
4. Find the location that has the maximum number of accidents.
5. Find the models of cars who had accidents.
6. Write the SQL statements required to create these relations, including appropriate versions of all primary and foreign key integrity constraints (5 Marks).

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| **Question No. 3 [15 Marks]** |

Consider the following table from a company database. This database holds information about employees and their jobs. The jobs are title dependent. Each employee wirks for a certain department and he/she has some tasks to do as his/her title tells. It also contains information about where his employee works and the telephone number of the room he works in.



1. a) What is wrong with this table?
2. b) Correct the above problems. (Hint: redesign the database)
3. c) For the tables you got indicate (Candidate Keys, Primary keys, Foreign keys)
4. d) Draw a suitable referential diagram for the database you got.

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| **Question No. 4 [15 Marks]** |

For a hospital, the following ERD is drawn. Each department must have many medical staff. Each staff must be allocated in only one department. Staffs may be classified into doctors, nurses, or technicians. Each doctor must investigate onr or more patients. Each patient must be examined by at least one doctor. One nurse must supervise one region but one region must contain many nurses. A technician may or may not work in a lab, but labs must contain many technicians. Each department must contain many rooms, and each room must be assigned to one department. Rooms are classified as either labs or regions or others.

1. a) Indicate on the diagram all missing symbols that indicate cardinality ratio, participation and subclasses.
2. b) Derive normalized tables from the ERD, indicating all candidate, primary and foreign keys for each relation.
3. c) Write the SQL statements required to create these relations, including appropriate versions of all primary and foreign key integrity constraints.

*Indicate any assumption you make that might or might not hold.*



**Question No. 5 [10 Marks]**

Suppose you are given a relation *R* with four attributes *ABCD*. For each the following sets of FDs, assuming those are the only dependencies that hold for *R*, do the following:

a) Identify the candidate key(s) for R.

b) Identify the best normal form that *R* satisfies (1NF, 2NF, 3NF, or BCNF).

c) If *R* is not in BCNF, decompose it into a set of BCNF relations that preserve the dependencies.

1. B → C, D → A

2. *A → B, BC → D, A → C*

**GOOD LUCK**