Université Libanaise
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Br. I

الجامعة اللبنانية
كلية الاعلام
الفرع الاول

امتحانات: الفصل الاول
من العام الجامعي 2023/2022

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|---|---|---|
| المرحلة: الاجازة | الدورة الاولى | المادة: Database I |
| السنة المنهجية: الأولى | | المدة: ساعتان |
| الاختصاص: علم البيانات | | اسم الاستاذ: د. ليندا محمودي |

**Part I: Multiple choice questions (20 points)**

**1- A database can be modeled as:**

a. collection of unorganized data on a particular subject
b. collection of organized information on a particular subject
c. collection of organized data on different subjects

**2- A DBMS is:**

a. the abbreviation of Database Management System
b. a software package designed to create, store and manage databases
c. a software to design the ER model only

**3- A relationship is:**

a. an association among several entities
b. descriptive proprieties possessed by all members of an Entity set
c. a set of one or more attributes whose values uniquely determine each entity

**4- The purpose of Generalization, in general, is:**

a. combine a number of entity sets that share the same feature into a higher level entity set
b. a bottom-up design process
c. a top-down design process

**Part II: The Data Design Process (20 points)**

Imagine that you have been assigned to a team that will be developing an inventory tracking system. As part of the project startup, your manager has asked each team leader to bring a basic work plan to the next meeting. At that meeting, these work plans will be analyzed to determine the overall project timeframe, costs, personnel requirements and software requirements.

For now, as the team leader for the data design team, you have been asked to bring a work plan that identifies the phases of data design (**phases for building a database**) and includes the following information for each phase:

a) a description of the data design phase,
b) the inputs of the phase,
c) the outputs of the phase,
d) a key issue addressed in the phase

**Part III: Supervision of PhD Students (60 points)**

A database needs to be developed that keeps track of PhD students:

- For each student store the name and matriculation number. Matriculation numbers are unique.
- Each student has exactly one address. An address consists of street, town and post code, and is uniquely identified by this information.
- For each lecturer store the name, staff ID and office number. Staff ID's are unique.
- Each student has exactly one supervisor. A staff member may supervise a number of students.
- The date when supervision began also needs to be stored.
- For each research topic store the title and a short description. Titles are unique.
- Each student can be supervised in only one research topic, though topics that are currently not assigned also need to be stored in the database.

**Tasks:**

a) Design an entity relationship (ER) diagram that covers the requirements above. Do not forget to include cardinality and participation constraints.

b) Based on the ER-diagram from above, develop a relational database schema. List Relations (tables) with their attributes. Identify keys and foreign keys.

c) Diagram the functional dependencies and determine the normal form for each relation.

d) Convert all relations to third form, if necessary, and draw a revised relational schema.

**Good luck**