



Course Title: Introduction to Database Systems (CSE 456)

Date: Nov, 2019

Allowed time: 1 H

No. of Pages: (2)

Answer the following questions... assume any missing data

استخدم الفراغات اسفل كل سؤال في الاجابة - يمكن استخدام الخلفية للورقة اذا لم تكن المساحة كافية

**Problem number (1) (14 Marks)**

**Q1-A ) (1 P) What Is meant by the term Data , give an example:**

**Q1-B ) (2 P) What Is a Database System? Then state its components for each write a short note?**

**Q1-C ) (2 P) State the relation between the following terms:**

- ➔ (RDB and OO DB)
- ➔ (DB manager, DB server, DB Engine, and DBMS)
- ➔ (DSL and DBMS)

**Q1-D ) (3 P) Define the relation between the following terms:**

(DB manager, DB server, DB Engine, DBMS)	DB Application (desktop-Web-Mobile)
Data and Meta Data	Integrity and integration
SQL and SQL server	Key and Index

**Q1-E ) (3 P) List 4 DB applications from the real daily life. For each, propose suitable (platform, DB Schema, E/R Diagram, DB sever )**

**(Q1-F) (2 P) State the most important two issues must be considered while designing DBMS for network environment**

**(Q1-G) (1 P) List Properties of Relational Tables**

## Problem number (2) (13 Marks)

(Q 1 - A) (2 P) Specify the value of the next terms (Degree – Cardinality) for the following DB models (Hierarchical – Network - OO)

**Q2-A) (2 P) Q5) WORKS\_ON [ESSN, PNo, Hours]**

**DEPENDENT [ESSN, Dep\_Name, DOB, Relationship]**

For the previous schema write a relational algebra statements that:

- I. Lists the ESSN's of employees who either have dependents or work on projects.
- II. List the ESSN's of employees who have dependents and work on projects
- III. List the ESSN's of employees who have dependents but do not work on projects.

**Q2-B) (3 P)**

Given two relations  $R1$  and  $R2$ , where  $R1$  contains  $N1$  tuples,  $R2$  contains  $N2$  tuples, and  $N2 > N1 > 0$ , give the minimum and maximum possible sizes (in tuples) for the result relation produced by each of the following relational algebra expressions. In each case, state any assumptions about the schemas for  $R1$  and  $R2$  that are needed to make the expression meaningful:

(1)  $R1 \cup R2$ , (2)  $R1 \cap R2$ , (3)  $R1 - R2$ , (4)  $R1 \times R2$ , (5)  $\sigma_{a=5}(R1)$ , (6)  $\pi_a(R1)$ , and (7)  $R1/R2$

(Q2- C) (2 P) State the different symbol which may be used in constructing E/R diagram for each state its usage and the variations

(4 Points) (4 P) What is meant by E/R diagram? Suppose you are given the following requirements for a simple database for the Egyptian football league (EFL): Construct an ER diagram for such database. the EFL has many teams,

- ❖ each team has a name, a city, a coach, a captain, and a set of players,
- ❖ each player belongs to only one team,
- ❖ each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
- ❖ a team captain is also a player,
- ❖ a game is played between two teams (referred to as host\_team and guest\_team) and has a date (such as May 16th, 2002) and a score (such as 6 to 1).