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UNIVERSITY REGULAR EXAMINATIONS
2ND SEMESTER 2012 /2013 ACADEMIC YEAR

FOR THE DEGREES OF
BACHELOR OF SCIENCE (COMPUTER SCIENCE)

AND

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

CODE: BIT 223

TITLE: INTRODUCTION TO DATABASE SYSTEMS

DATE: 19th August 2013

TIME: 9.00 am – Noon

INSTRUCTIONS

Answer **question one** and any other **two** questions only.

Question one carries 30 marks and the other questions carry 20 marks each.

Question One (30 Marks)

- a) Define each of the following terms as used in database systems; (4 Marks)
- i. Transaction
 - ii. Relation schema
 - iii. Relation Cardinality
 - iv. Relation Degree
- b)
- i. Explain what you understand by the term '*Integrity Constraint*'; (2 Marks)
 - ii. Outline any two types of Integrity Constraints that may govern a database (4 Marks)
- c) Outline the four properties of a transaction (4 marks)
- d) Highlight the two main motivations behind concurrent execution of database transactions (4 Marks)
- e) Elaborate the role of each of the following DBMS components; (4 Marks)
- i. Transaction Manager
 - ii. Recovery manager
- f) After a system crash, a DBMS executes the Analysis, Redo and Undo phase. Explain what entails each of these recovery phases (3 Marks)
- g) Using an appropriate example, define a View and outline how it is used as a security approach in database systems (5 Marks)

Question Two (20 Marks)

- i) Explain what you understand by the term 'normalization' (1 Mark)
 - ii) Explain the two main goals of normalization (4 Marks)
- b) Describe the three types of update anomalies normalization resolves (6 Marks)
- c) Given the following un-normalized table, normalize it up to the third normal form (3NF), explaining each step. Give the relations appropriate names (9 Marks)

ClientNo	Client Name	Property No	Property Owner	Property Add	Rent Start	Rent Finish
C001	John M.	P001	Muche M.	190, Kak	01/01/1991	31/12/1993
		P018	Jane K.	200, Msa	06/07/2004	23/06/2008
C116	Rose M.	P002	Simbe M.	112, Ksm	02/11/1998	09/02/1999
		P001			10/02/1999	30/11/1999
		P018			05/01/2001	29/12/2006

Question Three (20 Marks) Database Security

- a) Explain the three main security issues that one must consider when designing secure database systems (6 Marks)
- b)
 - i. Define the term ‘access control’ as used in database security (2 Mark)
 - ii. Explain the two main database approaches towards enforcing security through access control (6 Marks)
- c) Using appropriate examples, describe the use of GRANT and REVOKE SQL commands (7 Marks)

Question Four (20 Marks)

- a) Explain what you understand by the term ‘data definition language (DDL)’ as used in SQL (2 Marks)
- b) Apart from the CREATE statement, outline two other DDL statements (2 Marks)
- c) The human resource department in the office of president wishes to store data concerning its employees. This data entails the employee’s surname, middle name and first name. it also stores the KRA pin num, national ID number, their education level (primary, secondary, college certificate, diploma, degree, master or doctorate), their job designation (e.g. Chief, DO, DC, PC, Clerical, secretary, Technician e.t.c.), and their job group (mainly Group A to Group P).

Using this information, answer the following questions;

- i. Write the SQL statement that will create this database called *Human_Resource*
(2 Marks)
- ii. Identify the various tables that may be used in this database and write their relational schema
(6 Marks)
- iii. Write the DDL statements to create at least four of the above identified relations clearly implementing the integrity constraints
(8 Marks)

Question Five (20 Marks)

A database contains the following tables:

game_record(gid, player_id, position, number_of_goals)

player (player_id, player_name, team_id)

team (team_id, team_name)

game (gid, home_team, away_team, game_date, goals_home,goals_away)

The **team** table contains details of football teams, the **player** table contains details of players in the teams and the **game** table contains summary details of the games which the teams play. The **game_record** table contains rows which describe the performance of individual players in each game. Assume that tables can be joined on identically named attributes and that the attributes

home_team, **away_team** and **team_id** contain values from the same domain.

- i. Write in SQL queries which will:
 - a) List the teams in ascending order of team name together with a count of the number of home games played by that team; (5 Marks)
 - b) List the name of the home team involved in the most recent game. (Assume that each game row in the **game** table has a different value for game_date); (5 Marks)
 - c) List the name of each team together with the date of the most recent home game played by that team; (5 Marks)
 - d) List the names and positions of Sofapaka players in games won away from home (5 Marks)