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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2016/2017 ACADEMIC YEAR
SECOND YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: 8th August, 2016.
Time: 2.00pm – 4.00pm

KCS 207 - INTRODUCTION TO DATABASE SYSTEMS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) A tennis club uses the following table to record details of players and their coaches.

Players

| PlayerID | Name | Ranking | CoachID | CoachName |
|----------|------------|---------|---------|-----------|
| P001 | Little | 12 | C003 | Spode |
| P002 | Widgeon | 03 | C013 | Glossop |
| P003 | Prosser | 17 | C003 | Spode |
| P004 | Twistleton | 09 | C006 | Travers |

- i) Explain why the above table is not in 3rd normal form. (2 Marks)
- ii) Transform the table into 3rd normal form. (4 Marks)
- b) Suppose that we need to maintain a database of information about AFL football games. Information to be kept includes;

For each team :-(name, home ground, colour scheme, captain.)

For each player:-name, number, current team, goals in each game, previous teams.)

For each fan :-(name, years of membership, team.)

For each game :-(week number, teams, scores, ground, players.)

- i) List and describe all the entities associated with this database. (4 Marks)
- ii) Design an entity-relationship model for this database. Show the cardinality (1:1, 1:N, or N:M) and participation (total or partial) for each relationship. (6 Marks)

- c) Give English statements for each of the following SQL queries;
- i) Select distinct Position from Staff, Sale where Sale. Staff = Staff. Name (2 Marks)
 - ii) Select Client, count (distinct Staff) from Sale group by Client. (2 Marks)
- d) Explain the three-schema Database systems Architecture. (6 Marks)

QUESTION TWO (20 MARKS)

- a) Define the following Integrity Constraints as used in relational databases;
- i) Entity Integrity
 - ii) Referential Integrity
 - iii) Domain Constraints
 - iv) Key Constraints
- b) Analyze three desirable properties of DBMS (8 Marks)
- c) Describe the Architecture of DBMS with proper Figure(s). (6 Marks)
- (6 Marks)

QUESTION THREE (20 MARKS)

- a) Define the following terms;
- i) Candidate key.
 - ii) Foreign key
- b) Consider the 1NF relation R(A,B,C,D,E,F,G,H,J,K). Suppose the dependencies are;

A, B → C
 A → D, E
 B → F
 F → G, H
 D → J, K

- i) What is the key for R? (2 Marks)
- ii) Decompose R into 2NF relations. Then decompose R into 3NF relations. (6 Marks)
- iii) Can R be decomposed into BCNF? (2 Marks)

QUESTION FOUR (20 MARKS)

- a) Discuss the ACID properties of transactions (8 Marks)
- b) Outline the three goals of database security (6 Marks)

QUESTION FIVE (20 MARKS)

- a) Given the table below, where A, B, C, D and E represent the attributes of the table. A D is one example of a functional dependency in this table. Find two other dependencies.

| A | B | C | D | E |
|----|----|----|----|----|
| a1 | b1 | c1 | d1 | e1 |
| a1 | b2 | c2 | d1 | e2 |
| a1 | b3 | c1 | d1 | e3 |
| a2 | b1 | c1 | d2 | e4 |
| a2 | b2 | c2 | d2 | e5 |

- b) A country bus Company owns a number of buses. Each bus is allocated to a particular route although some routes may have several buses. Each route passes through a number of towns. One or more drivers are allocated to each stage of a route, which corresponds to a journey through some or all of the towns on a route. Some of the towns have a garage where buses are kept and each of the buses are identified by their registration number and can carry different number of passengers, since the vehicles vary in size and can be single or double decked. Each route is identified by a route number and information is available on the average number of passengers carried per day for each route. Drivers have an employee number, name, address and sometimes a telephone number.
(6 Marks)
 - i) List all the possible entity types and their attributes that can be derived from the above bus company narrative. (6 Marks)
 - ii) List any three possible cardinality in the entity types relationships that can be derived from the bus company. (3 Marks)
 - iii) Draw the E-R diagram for the bus company. (5 Marks)