CRAWFORD UNIVERSITY, FAITH CITY, IGBESA

COLLEGE OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF COMPUTER AND MATHEMATICAL SCIENCES
HARMATTAN SEMESTER **SESSION: 2021/2022**

COURSE CODE: CSC307 COURSE TITLE: DATABASE DESIGN AND MANAGEMENT
UNITS: 3 TIME: 3HOURS

SECTION A (ANSWER ALL)

1. Assume we have the following application that models Africa country teams in the just concluded AFCON, the games they play, and the players in each team. In the design, we want to capture the following:

    - We have a set of teams, each team has an ID (unique identifier), name, main stadium, and to which city this team belongs.
    - Each team has many players, and each player belongs to one team. Each player has a number (unique identifier), name, DOB, start year, and shirt number that he uses.
    - Teams play matches, in each match there is a host team and a guest team. The match takes place in the stadium of the host team.
    - For each match we need to keep track of the following:
        - The date on which the game is played
        - The final result of the match
        - The players participated in the match. For each player, how many goals he scored, whether or not he took yellow card, and whether or not he took red card.
        - During the match, one player may substitute another player. We want to capture this substitution and the time at which it took place
    - Each match has exactly three referees. For each referee we have an ID (unique identifier), name, DOB, years of experience. One referee is the main referee and the other two are assistant referee.

    a. Design an ER diagram to capture the above requirements. State any assumptions you have that affects your design (use the back of the page if needed). Make sure cardinalities and primary keys are clear. 10marks

    b. Write a query to count the number of players that comes from a country that contain letter "enu" 2marks

    c. State three (3) benefits of normalization 3marks

SECTION B ANSWER ANY TWO QUESTIONS

3a. Explain the term "Transitive dependency" 2marks

b. Consider the following relational database schema

Passenger (pid, pname, pgender, pcity) Agency (aid, aname, acity) Flight (fid, fdate, time, src, dest)

Booking (pid, aid, fid, fdate)

Answer the following questions using relational algebra queries: 10marks

i. Get the complete details of all flights to Lagos
ii. Get the details about all flights from Kano to Lagos.
iii. Find only the flight numbers for passenger with pid 123 for flights to Kano before 06/11/2020.
iv. Get the details of flights that are scheduled on either of the dates 01/12/2020 or 02/12/2020 or both at 16:00 hours.
v. Find the passenger names for those who do not have any bookings in any flights

c . List and explain the three (3) types of database architecture 3marks

4a. List five (5) attributes of Database Management System. 5marks

b . Write out relational algebra using the following relational schema

Student (id, name), enrolledIn (id, code), courses (code, score, lecturer)

i. The names of all the lecturers?
ii. Display the student names and their respective scores
iii. The names of all the students that enrolled for CSC307?
iv. The names of students whose score is less than 70
v. Display the name of all students that did not enrolled for CSC307 taken by Kola 10marks

5a. Write out relational algebra using the following relational schema

Chemical (Chem_code, name, color, state), Condition (Cond_code, details)

i. Display the details of a blue chemicals. 3marks
ii. Display the state of all chemicals whose condition code is ZXT100. 3marks
iii. Rename the two relational schemas to liquid and information respectively. 3marks

b. Explain the following: i. Mapping cardinality ii. Recursive relationship iii. Relationship set 6marks

6a. Explain the following: i. Data integrity ii. Logical database designer iii. Schema iv. Data model v. Logical data independence 5marks

b. Write a structural query language to perform the following;

Student (name, dept, scores, grade)

i. Display the name of students who are not in Computer Science Department. 2marks
ii. Display the names, score, and grade of student in descending order. 2marks
iii. Display names of the student whose name did not end with "um". 2marks
iv. Display the number of students in each department. 2marks
v. Student details whose score is greater than the average score 2marks