CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN INFORMATION SCIENCE

BSIS 456: DATABASE CONSTRUCTION

STREAMS: BSC. INFO SCI Y4S1   **TIME:2 HOURS**

DAY/DATE: TUESDAY 10/12/2019   **2.30 P.M – 4.30 P.M**

INSTRUCTIONS:
Answer question 1 and any other two

SECTION A: Answer all questions in this section
QUESTION ONE (30 Marks)

a) # From an SQL user's perspective, does the relational model provide logical and physical

b) # data independence?

a) Consider a social network database, about people and their relationships. The database has two relations:

Person(pid, name)

Relationship(pid1, rel, pid2)

Here Person.pid is a key, and Relationship.pid1 and Relationship.pid2 are foreign keys; rel is a string representing the relation type, and can be friend or enemy. Note that the relationship is not necessarily symmetric: if Alice is friend with Bob, this does not imply that Bob is friend with Alice. Assume that pid's are integers, and name

and rel are character strings. Write the SQL statements that define the relational schema for:

    (i) The Person relation.   **[5 Marks]**

    (ii) The Relationship Relation.   **[5 Marks]**

    (iii)   Write a SQL query that computes, for each person, the total number of their friends. Your query should return results containing the pid, the name, and the count. Note that your query must return exactly one answer for every person in Person.   **[5 Marks]**

    (iv) Identify the distinct entities and their respective attributes in the description given above.   **[4 Marks]**

b) Giving examples, explain any **TWO** functions of databases.   **[4 Marks]**

c) Discus any **TWO** duties of a database developer.   **[4 Marks]**

d) Outline any **THREE** advantages of databases.   **[3 Marks]**

SECTION B: ATTEMPT ANY TWO QUESTIONS (40 MARKS)

QUESTION TWO (20 MARKS)

a) Giving clear examples, discuss **THREE** constraints that should be enforced in a database.   **[6 Marks]**

b) Consider the following SQL script to answer the questions that follow:

```sql
CREATE DATABASE ORG;
SHOW DATABASES;
USE ORG;

CREATE TABLE Worker (
    WORKER_ID INT NOT NULL PRIMARY KEY AUTO_INCREMENT,
    FIRST_NAME CHAR(25),
    LAST_NAME CHAR(25),
    SALARY INT(15),
    JOINING_DATE DATETIME,
    DEPARTMENT CHAR(25)
);
```

    i)   Write An SQL Query To Fetch "FIRST_NAME" From Worker Table Using The Alias Name As <WORKER_NAME>.   **[3 Marks]**

    ii)   Write An SQL Query To Fetch "FIRST_NAME" From Worker Table In Upper Case.   **[3 Marks]**

    iii)   Write An SQL Query To Fetch Unique Values Of DEPARTMENT From Worker Table.   **[3 Marks]**

c) Explain any **FIVE** applications of databases in the real world. **[5 Marks]**

QUESTION THREE (20 MARKS)

a) An online picture sharing company uses a database with the following schema:

create table Usr (uid int primary key, uname text not null, city text not null);
create table Picture (pid int primary key, uid int not null references Usr(uid), size int not null, pdf text);

Every user has a key (uid), a name (uname) and a city. Every picture has a key (pid), an author (uid) that is a foreign key to Usr, a size, and the pdf content (which is plain text).

    (i)   Write a SQL query that retrieves all users who have only pictures of less than 1MB (size < 1000000). Your query should return the users' uid and uname. **[5 Marks]**

    (ii)   Represent the schema using an E-R diagram. **[5 Marks]**

b) What is the best data type definition for Ms. Access when a field is alphanumeric and has a length that can vary? **[2 Marks]**

c) Explain the differences between the first **THREE** normal forms. **[6 Marks]**

(d)   Define consistency as used with databases. **[2 Marks]**

QUESTION FOUR (20 MARKS)

a) Explain the database design process stages. **[5 Marks]**
b) Describe any **THREE** popular DBMS's. **[6 Marks]**
c) Explain the purpose of TP Monitors in transactions management. **[5 Marks]**
d) Describe the two laws of concurrency control. **[4 Marks]**

QUESTION FIVE (20 MARKS)

(a) Clearly explain any **THREE** properties that transactions in a database must conform to.
[6 Marks]
(b) Describe **THREE** different types of database users. **[6 Marks]**
(c) Describe what dependability entails in transaction processing. **[6 Marks]**
(d) Define the term database. **[2 Marks]**