FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SCHOOL OF INFORMATION AND COMMUNICATION TECHNOLOGY

DEPARTMENT OF INFORMATION AND MEDIA TECHNOLOGY

FIRST SEMESTER 2014/2015 EXAMINATION

COURSE CODE:	CIT314
COURSE TITLE:	**DATABASE CONCEPTS & SYSTEMS**
CREDIT UNITS:	2
TIME ALLOWED:	2 HRS
COURSE LECTURER(S):	BILKISU BELLO
NUMBER OF QUESTIONS:	5
NUMBER OF PAGES:	3 (INCLUDING THIS PAGE)

INSTRUCTIONS

- Answer **ANY FOUR** questions
- Do **not** use red pen
- Please use a clear handwriting
- This exam is closed book, closed notes, closed laptop and closed cell phone .
- Please use non-programmable calculators only

1. a) Explain the following terms: *(12 marks)*

    i.   Attribute   ii. Domain   iii. Entity   iv. One-to-many relationship

    iv.   Weak entity set   vi. Aggregation   vii. Superkey   viii. Candidate key

    b) Explain three advantages of using a DBMS instead of simply storing data in operating system files.
    (3 marks)

2. a) A company database needs to store information about employees (identified by nin, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.

    Draw an ER diagram that captures this information. *(10 marks)*

    b) What is a data model? *(2 marks)*

    c) If r and s are two different relations such that $r \neq s$. What are the required conditions that must hold

        for a difference operation r - s to be valid? *(3 marks)*

3. a) Explain succinctly the following terms: (9 marks)

    i.   Atomicity   ii. Durability   iii. Blind write   iv. Dirty read

    v.   Serializable schedule   vi. Recoverable schedule

    b) Two schedules S1 and S2 are said to be view equivalent if certain conditions hold. Explain these conditions. *(4 marks)*

    c) When is a schedule said to be conflict-serializable? *(2 marks)*

4. Consider the following schema:
    Suppliers(<u>sid: integer</u>, sname: string, address: string, city: string)
    Parts(<u>pid: integer</u>, pname: string, color: string)
    Catalog(<u>sid: integer, pid: integer</u>, price: real)

The Suppliers relation describes suppliers of parts. The Parts relation contains information about each part. The Catalog relation lists the prices in dollars charged for parts by suppliers. (The keys are underlined: sid is a key for Suppliers, (sid,pid) is a key for Catalog, and pid is a key for Parts.)

a) Write the following queries in SQL (*8 marks*):

   i.   Find the names of suppliers who supply all black parts.

   ii.   Find the names and addresses of Suppliers in Lagos.

   iii.   Find the names and prices of all the parts in the Catalog

   iv.   Find the price of the least expensive part.

b) Write the following queries in Relational Algebra (*7 marks*)

   i.   Find the names of suppliers who supply all blue parts.

   ii.   Find the names and addresses of Suppliers in Minna.

   iii.   Find the names, colors and prices of all the parts in the Catalog

5. a) With the aid of a transaction schedule, explain the concept of Deadlock. *(4 marks)*

    b) What are the basic lock modes permissible on data items running in concurrent transactions, explain with a Compatibility Matrix. *(5 marks)*

    c) Briefly describe the relational database design phases. *(4 marks)*

    d) As a database designer, explain two (2) design flaws you must always avoid when confronted with the issue of how to represent various entities of interests? *(2 marks)*