FEDERAL UNIVERSITY OF TECHNOLOGY MINNA
SCHOOL OF INFORMATION & COMMUNICATION TECHNOLOGY
DEPARTMENT OF INFORMATION & MEDIA TECHNOLOGY
FIRST SEMESTER EXAMINATION 2012/2013 SESSION
CIT 314: DATABASE CONCEPTS & SYSTEMS

INSTRUCTION: ANSWER TWO (2) QUESTIONS IN **EACH** SECTION. ALL QUESTIONS CARRY EQUAL MARKS
TIME ALLOWED: 2 HRS

SECTION A

1. a) Explain the following terms briefly: *(9 marks)*
   i. domain,
   ii. one-to-many relationship,
   iii. weak entity set,
   iv. aggregation,
   v. Superkey
   vi. Candidate key

   b) A company database needs to store information about employees (identified by *ssn*, 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. *(6 marks)*

2. a) Explain two advantages of using a DBMS instead of simply storing data in operating system files.*(3 marks)*
   b) When would it make sense ***not*** to use a database system? *(1 marks)*
   c) How does the recovery manager ensure atomicity of transactions? How does it ensure durability? *(2 marks)*
   d) Define the following terms: *(9 marks)*
      i. consistency,
      ii. isolation,

iii. blind write,

iv. dirty read,

v. serializable schedule,

vi. recoverable schedule

3. a) Consider the SQL query whose answer is shown in Figure 1 below. *(6 marks)*

Std	Name	Login	Age	Gpa
2011/1/35674CI	Christopher	chris@futminna	19	3.0
2010/1/36782CI	Olufunmi	funmi@futminna	18	4.2
2011/2/32789CI	Maria	maria@futminna	21	1.8

Figure 1: Students with age less than 22 on Instance of the Students S Table

i. Modify this query so that only the *login* column is included in the answer.

ii. If the clause WHERE *S.gpa >= 2* is added to the original query, what is the set of tuples in the answer?

iii. Write the Relational Algebra equivalent of the SQL query whose answer is shown in Figure 1.

iv. Write the Relational Algebra equivalent of your SQL query in (i) above.

b) Which SQL keyword is used to sort the result–set? *(1 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 union operation $r \cup s$ to be valid? *(3 marks)*

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

e) Differentiate between a database schema and a database instance. *(3 marks)*

SECTION B

1. What are the essences of relational databases Normal Forms? Explain **FOUR** relational database design pitfalls. *(15 marks)*
2. What are the basic lock modes permissible on data items running in concurrent transactions, explain with a Compatibility Matrix. *(15 marks)*
3. Explain the concept of Multiple Granularity. What are the types of lock modes permissible in Multiple Granularity and draw the compatibility matrix. *(15 marks)*