**NNAMDI AZIKIWE UNIVERSITY AWKA**

**DEPARTMENT OF ELECTRONIC AND COMPUTER ENGINEERING**

**SECOND SEMESTER 2016/2017 REGULAR EXAMINATION**

**ECE 542: Database Management System**

**Instruction:** See instructions at the beginning of each section. Time allowed: 3hrs

**SECTION A – Attempt all Questions**

1. i) Define database, knowledgebase and expert systems

ii) Give three differences between database and Knowledge base

iii) How many distinct arity and tuples are in a relation instance with cardinality of 24 and degree of 8?

iv) Show diagrammatically the three schema architecture

v) List 4 characteristics of a good business rule

**SECTION B – Answer any two (2) questions from this section**

2. i) Give one example of DML (2mks)

ii) List 4 major disadvantages of conventional file system (2mks)

Consider the following scenario: in one of your client organization, a salesperson may manage many other salespeople but each salesperson is managed by only one salespeople. A salesperson can be an agent for many customers but a customer is managed by not more than 2 salespeople. A customer can place many orders. An order can be placed by no more than one customer. An order lists many inventory items and an inventory item may be listed on many orders.

iii) Design the above using the conceptual schema. (4mks)

iv) Draw an ERD to capture the above scenario, clearly showing every constraint. (6mks)

Specify clearly every assumption made.

3. i) What is a supertype/subtype hierarchy (2mks)

ii) List 4 main disadvantages of Database approach to data storage (2mks)

Our university database contains information about professors (identified by staff ID number or SID) and courses (identified by courseid). Professor teaches courses; each of the following situations concerns the **Teaches** relationship set. For each situation (questions), draw an ER diagram that describes it (assuming no further constraint holds).

1. Professor can teach the same course in several semesters and each offering must be recorded. (2mks)
2. Professor can teach the same course in several semesters, and only the most recent such offering need to be recorded. (2mks)

(Assume the condition in ii. applies in all subsequent questions)

1. Every Professor must teach some course. (2mks)
2. Every professor teaches exactly one course (no more, no less). (2mks)
3. Every professor teaches exactly one course (no more, no less), and every course must be taught by some professor. (2mks)

4. i) In simple, straightforward term, what is metadata? (2mks)

ii) List 4 different data models (2mks)

The graduating class of 2017 were required to set up a database capturing all students of the university specifying the type of studentship (regular, cep, and sandwich). It is required to capture the courses enrolled by the students. Each student must enroll in at least one course and each course could be taken by many student. Some courses may be unenrolled by any student. Every sandwich student must be employed in a secondary school which needs to be captured. A school may have more than one of the sandwich students as their employee. The CEP students may or may not be employed, but where employed the employment record must be captured. A student cannot be employed by more than one organization.

iii) Create a conceptual schema design for the above (4mks)

iv) Draw an ERD to capture the above scenario, clearly showing every constraint (6mks)

Specify clearly every assumption made.

**SECTION C – Answer any two (2) questions from this section**

5. i) Define Normalization of a relational database.

ii) Describe the types of anomalies that can exist in managing a database that requires normalization

iii) List the different types of normal forms for relational schema and mention two important basic rule of any of them

iv) Explain the concept of decomposition.

6 i) Give a scenario that showcases the three objectives of database security in a real world situation.

ii) Define the construct used to provide security support in database management systems.

iii) Enumerate and explain five business conditions that encourage the use of distributed database

7 i) What is the implication of concurrency control in a distributed database management system

ii) Define the term transaction of a database.

iii) What are the properties of a transaction and how are they maintained in a database.