



**THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY**  
**DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE**  
**SECOND SEMESTER EXAMINATION 2022**

**CS423 ADVANCED DBMS**

**BACHELOR OF SCIENCE IN COMPUTER SCIENCE**  
**YEAR 4**

**TIME ALLOWED: THREE (3) HOURS**

**INFORMATION FOR STUDENTS:**

1. You have **TEN (10)** minutes to read the paper.  
You must **NOT** begin answering during this time.
2. This is a closed book exam, only drawing instruments and calculators are allowed. No **ELECTRONIC DEVICES PERMITTED**.
3. There are 5 questions in this paper. Answer **ALL** questions.
4. All questions carry equal marks as shown. The paper is worth 50 marks.
5. If you are found cheating in the examination, the penalties specified by the University shall apply.
6. All **MOBILE** phones must be turned off before the start of the examination and remain **OFF** during examination period.

### **QUESTION ONE: Review - Relational Concepts [10 Marks]**

The relational database with its entity-relationship (E-R) model is the most commonly used and widely understood concept. With respect to this model, **briefly and clearly** explain the following:

- i) The role of normalization and its importance. (The roles of 1NF to 3NF must be clearly differentiated in your explanation along with the need for single-valued, full-dependency). [5 marks]
- ii) Despite the widespread use and clear understanding of the model, why do/would organizations or database designers need additional models to supplement the E-R model? [5 marks]

### **QUESTION TWO: XML [10 Marks]**

XML databases are also commonly used today. Unlike relational databases which store data in tables, XML databases store information in text-based XML documents.

- i) XML is said to be self-describing. What does that mean? [2 marks]
- ii) What type of data structure does XML use? [1 mark]
- iii) Despite the fact that XML data is structured, XML databases are referred to as being semi-structured. Why? [3 marks]
- iv) From the perspective of data storage and retrieval, i.e., data exchange between a relational database and an XML database, what is an important difference between relational data and XML data apart from the obvious differences in their schema which constrains their different data structures? [4 marks]

### **QUESTION THREE: Terminology [10 Marks]**

- i) What is meta data and explain why it is important. [2 marks]
- ii) What is a database Schema and explain how it affects the use of a RDBMS? [2 marks]
- iii) In relation to XML databases (XML documents), explain what a vocabulary/language is and the roles namespaces, DTDs, and Schemas play in relation to vocabulary or its validation? [4 marks]

- iv) How does Schema affect data transfer between different types of databases? [2 marks]

**QUESTION FOUR: NoSQL [10 Marks]**

- i) NoSQL scales out better than relational databases and is used for Big data and real-time web applications by companies like Twitter, Facebook and Google which collect terabytes of user data every day. Give a short, clear explanation/description of the NoSQL concept. [5 marks]
- ii) Two most common data consistency models are known by the acronyms ACID and BASE. Explain what each of these acronyms mean and which database uses each of them. [5 marks]

**QUESTION FIVE: Data Warehouse [10 Marks]**

- i) What is a Data Warehouse? [2 marks]
- ii) “A Data Warehouse is an organization’s operational database”. Is this statement True or False? Justify your answer with a brief explanation. [2 marks]
- iii) Data Warehousing makes data mining possible. What is data mining? [2 marks]
- iv) What are the four components of a Data Warehouse? [4 marks]