



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF COMMUNICATION AND INFORMATION SCIENCE**  
**DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE**

**BACHELOR OF SCIENCE HONOURS DEGREE IN LIBRARY AND INFORMATION SCIENCE**

**DATABASE DESIGN AND MANAGEMENT IN INFORMATION CENTRES**

**ILI 2109**

**First Semester Examination Paper**

**May 2017**

This examination paper consists of 3 pages

**Time Allowed:** 3 hours  
**Total Marks:** 100  
**Special Requirements:** None  
**Examiner's Name:** Mr. E.Mupaikwa

**INSTRUCTIONS**

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Importance is attached to accuracy, clarity of expression and legible handwriting

**MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
1.	25
2.	25
3.	25
4.	25
5.	25
6.	25

1.1. With the aid of annotated diagrams, discuss the differences between the different layered architectures of database models. [15 marks]

1.2 Examine the components of the Object Oriented Database Management Systems. [10 marks]

2.1 Analyse the characteristics of the following types of dependencies:

2.1.1 Multi-valued dependency [5 marks]

2.1.2 Full functional dependency [5 marks]

2.2 Normalise the schema below to 3NF stating all assumptions, primary keys, candidate keys and foreign keys:

Students (First\_name, Surname, IdNo, Gender, DateOfBirth, Student\_Number, Physical\_Address, Postal\_Address, Telephone\_Number, Course, Programme, University, Grade, Year) [15 marks]

3.1 Write SQL statements to perform the following:

3.1.1 Create a table called Accounts, with the following schema indicating assumed data types and field sizes:

Accounts (Customer\_name, IdNo, Physical\_Address, Postal\_Address, Telephone\_Number, Order\_Number, Order\_Date, Order\_Value) [5 marks]

3.1.2 Insert a new record into the table Accounts [5 marks]

3.1.3 Change the Physical\_Address value for a given Customer\_Name [5 marks]

3.2 With the aid of examples, assess the differences between partial participation and total participation of entity sets [10 marks]

4.1 Describe the concept of a database transaction [5 marks]

4.2 Analyse the operations of the following concurrency control approaches

4.2.1 Lock-based concurrency control [5 marks]

4.2.2 Optimistic concurrency control [5 marks]

4.2.3 Time stamp-based concurrency control [5 marks]

4.2.4 Multi-version concurrency control [5 marks]

4. Examine the potential benefits of implementing data warehouses in information centres. [25 marks]

6. Assess the security challenges that may be faced in the development and use of distributed databases and suggest how these challenges may be addressed. [25 marks]