



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF COMMUNICATION AND INFORMATION SCIENCE
DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
DATABASE DESIGN AND MANAGEMENT IN INFORMATION CENTRES

ILI 2109

First Semester Examination Paper

November 2016

This examination paper consists of 3 pages

Time Allowed: 3 hours
Total Marks: 100
Special Requirements: None
Examiner's Name: 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

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
6.	25

1.1 With the aid of a diagram, examine the three level architecture of a database system and the main functionality of each level in this architecture. [15 marks]

1.2 Discuss the working process of a database system. [5 marks]

1.3 What is ACID in relation to database concepts? [5 marks]

2.1 Determine how concurrence control can be achieved in a database system. [5 marks]

2.2 Draw an ER-diagram to describe the following real world problem. [20 marks]

A University is organised into faculties. Each faculty has a unique Name, Faculty_ID and a number of lecturers and a specific lecturer is chosen to lead the faculty as the Dean. A dean can only lead one faculty at a time and is identified by Dean_Name and Faculty_Name. Each faculty comprises several departments, each headed by a Chairperson. Each department comprises several programmes and each programme is identified by the Programme_Id and Programme_Name. Each department provides a number of courses. Each course has a unique Course_name and Course_Id. Each lecturer has a Name, Emp_Number, Home_Address, Salary, Gender, and Courses by him/her. Each lecturer belongs to a department and can teach several courses. Each student has a Name, Student_Id, Address and gender. Each student can choose one program from one department and several courses from other departments within the faculty.

3. Analyse features of relational database systems with reference to Codd's twelve rules. [25 marks]

4. Discuss the following concurrency protocols with the aid of examples where necessary

4.1 Lock-based protocols. [12 marks]

4.2 Time-stamp based protocols. [13 marks]

5. Given the following schema, normalize to 4NF, explaining all stages and your choice for primary keys:

Patron(Patron_ID, First_Name, Surname, Gender, Department_Name, Department_Code, Faculty_Code, Faculty_Name, ISBN, Author, Year_Publishied, Book_Title, Publisher, Place_Published). [25 marks]

- 6.1 Discuss characteristics of data warehouses. [10 marks]
- 6.2 With the aid of annotated diagrams assess the following data warehouse architectures
- 6.2.1 Two-tier data warehouse. [5 marks]
- 6.2.2 Three-tier data ware house. [5 marks]
- 6.2.3 Bottom-up data warehouse. [5 marks]