



GWANDA STATE UNIVERSITY

FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF GEOMATICS AND SURVEYING

DATABASE AND DATABASE DESIGN

ESG 3107

Examination Paper

November 2023

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr. J.B Manyati

INSTRUCTIONS

Answer ALL questions

QUESTION 1 **25**

Define the following terms:

- a) Name and Briefly outline any 5 disadvantages of the Traditional File-based systems in comparison to database design systems. [10]
- b) With the aid of examples where applicable, explain the following key terms as applied to database design;
 - i. Concurrency [2]
 - ii. data element [2]
 - iii. data inconsistency [2]
 - iv. data isolation [2]
 - v. data integrity [2]
- c) What are the fundamental properties of a Database? [5]

QUESTION 2 **25**

- a) Differentiate (*in tabular form and citing examples on each model*) between **High-level Conceptual Data Models** and **Record-based Logical Data Models**. [8]
- b) Scrooge McNugget wants to store information (*names, addresses, descriptions of embarrassing moments, etc.*) about the many ducks on his payroll. Not surprisingly, the volume of data compels him to buy a database system. To save money, he wants to buy one with the fewest possible features, and he plans to run it as a stand-alone application on his PC clone. Of course, Scrooge does not plan to share his list with anyone. Indicate which of the following DBMS features Scrooge should pay for; in each case also indicate why Scrooge should (or should not) pay for that feature in the system he buys.
 - 1. A security facility. [3]
 - 2. Concurrency control. [4]
 - 3. Crash recovery. [4]
- c) What are the roles of data administration and database administration? [6]

QUESTION 3 **25**

- a) What is normalisation? [5]
- b) Discuss on the ANSI/SPARC architecture of relational databases [15]

QUESTION 4 **25**

- a) By citing any two of the major activities involved in database design, explain in detail the processes involved in those activities [10]

- b) Consider the instance of the Students relation shown in the table and answer questions that follow.

FIELDS (ATTRIBUTES, COLUMNS)

Field names →

<i>sid</i>	<i>name</i>	<i>login</i>	<i>age</i>	<i>gpa</i>
50000	Dave	dave@cs	19	3.3
53666	Jones	jones@cs	18	3.4
53688	Smith	smith@ee	18	3.2
53650	Smith	smith@math	19	3.8
53831	Madayan	madayan@music	11	1.8
53832	Guldu	guldu@music	12	2.0

TUPLES
(RECORDS, ROWS) →

- a) Give an example of an attribute (or set of attributes) that you can deduce is not a candidate key, based on this instance being legal. [2]
- b) Is there any example of an attribute (or set of attributes) that you can deduce is a candidate key, based on this instance being legal? [3]
- c) Explain the difference between external, internal, and conceptual schemas. [10]

END OF EXAMINATION