LAIKIPIA UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2023/2024 ACADEMIC YEAR

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (ICT)

COMP 125: INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

STREAM: R ***TIME: 2 HRS***

DAY: MONDAY [8.30A.M – 10.30A.M] ***DATE: 15/04/2024***

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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INSTRUCTIONS

- Answer **ALL** questions in section A and any **TWO** questions in section **B**
- All questions in section **B** carry equal marks

SECTION A (30 MARKS)

QUESTION ONE (30 MARKS)

a) Distinguish between:

i. DDL and DML commands **(2 Marks)**

ii. File based system and DBMS **(2 Marks)**

b) Discuss the **FIVE** components of the database management system. **(5 Marks)**

c) Define the following terms as used in database transaction management

i. Atomicity **(2 Marks)**

ii. Serializability **(2 Marks)**

d) What are constraints? Discuss **TWO** constraints used in databases. **(5 Marks)**

e) Compare the following:

i. Composite attribute and multivalued attribute **(2 Marks)**

ii. Foreign key and primary key **(2 Marks)**

f) With the aid of an example, distinguish between entity integrity constraints and domain constraints as used in databases. **(4 Marks)**

Write an SQL statement to order a list of students alphabetically **(2 Marks)**

g) Describe **TWO** characteristics of a well-designed database. **(2 Marks)**

SECTION B EACH QUESTION IS WORTH 20 MARKS ANSWER ANY TWO QUESTIONS IN THIS SECTION.

QUESTION TWO (20 MARKS)

a) Explain the **FOUR** ACID properties of a transaction **(4 Marks)**

b) Explain **TWO** limitations of the file based approach that are resolved by the database approach. **(4 Marks)**

c) Below is a list of potential entities for Laikipia University database.

i. Student

ii. Lecturer

iii. Courses

Draw an ERD diagram showing all possible attributes together with Primary Key and Foreign key dependencies. **(6 Marks)**

d) Explain **THREE** categories of anomalies that may be experienced when working with tables that are not normalized **(6 Marks)**

QUESTION THREE (20 MARKS)

a) Define the term normalization. **(2 Marks)**

i. State why normalization is important in database design. **(2 Marks)**

ii. Demonstrate with your own table examples and explanations how it is done. Include 1NF, 2NF, 3NF **(9 Marks)**

iii. Why is denormalization important? **(1 Mark)**

b) Write SQL statement to perform each of the following:

i. Delete all loans with loan numbers between 1300 and 1400 from a deposit table

(2 Marks)

ii. Increase all balances by 5% in a deposit table **(2 Marks)**

iii. Display empname, department where salary is greater than 50,000 from the deposit table **(2 Marks)**

QUESTION FOUR (20 MARKS)

a) Explain generalization, specialization and aggregation with examples **(9 Marks)**

b) Explain using examples concurrency control with time stamping methods. **(6 marks)**

c) Discuss about deadlocks in databases. **(5 marks)**

QUESTION FIVE (20 MARKS)

a) Use the table (STUDENT) below to answer the questions that follow

STU_ID	SURNAME	OTHERNAMES	COURSE	FEE
ST_001	MUTULA	PETER	BSC_IT	7000
ST_002	MWANGI	JANE	BCOM	6500
ST_003	ALI	PETER	BSC_IT	7000
ST_004	MWANASHE	SARAH	BSC_IT	7000

i. Write SQL statement to create the above table: STUDENT **(3 Marks)**

ii. Write SQL statement to insert data new record number 5. Use your own data **(2 Marks)**

iii. Write SQL statement to change MUTULA to KILONZO in record 1 **(2 Marks)**

iv. Write SQL statement to list all details for those doing BSC-IT **(2 Marks)**

v. Write SQL statement to add fees for all those students doing BSC-IT **(2 Marks)**

vi. Write SQL statement to add another attribute called ADDRESS. **(2 Marks)**

b) Design an E/R diagram describing the following domain: **(7 marks)**

a. A person has attributes pid (key) and name

b. A skier is a type of person with attribute aptitude

c. A snowboarder is a type of skier

d. A pairofskis has attribute sid (key) and model

e. A snowboard has attribute sid (key) and model

f. A skier owns zero or more pairofskis. The ownership relation has a purchase price. A pairofskis is owned by at most one skier

g. A snowboarder owns zero or more snowboards.the ownership relation has a purchase price. A snowboard is owned by at most one snowboarder

h. A person can rent a pairOfskis or a snowboard. A person cannot rent more than one pairOfskis or one snowboard at the same time. A person cannot rent a pairOfskis and a snowboard at the same time either. A piece of equipment can be rented by at most one person a time. The rental comes with a start date and an end