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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
KCS 2103 – DATABASE DESIGN

Date: 16TH April 2024
Time: 8:30AM – 10:30AM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Define the following terms:
- i) Atomicity? (2 Marks)
 - ii) Database Normalization (2 Marks)
- b) Explain the distinctions among the terms primary key, candidate key, and Composite key. (6 Marks)
- c) Consider the school database, where the primary keys are underlined.
- i) Write an SQL statement to display all records in student table (3 Marks)
 - ii) Give an SQL statement to add a new record into the department table (5 Marks)
- d) Define the following terms as used database Systems
- i) DDL
 - ii) DML (4 Marks)
- e) Discuss with examples the E-R model, examples should be based in a perception over a real-world solution. (4 Marks)
- f) Explain the two levels of data independence from conceptual to external level (4 Marks)

QUESTION TWO (20 MARKS)

- a) Explain the four types of relationships in relational databases, using at least four pairs of database tables for each to depict the relationship (8 Marks)
- b) Explain the three levels of architecture of DBMS (12 Marks)

QUESTION THREE (20 MARKS)

- a) The Motor Vehicle Branch administers driving tests and issues driver's licenses. Any person who wants a driver's license must first take a learner's exam at any Motor Vehicle Branch in the province. If he/she fails the exam, he can take the exam again any time after a week of the failed exam date, at any branch. If he passes the exam, he is issued a license (type = learner's) with a unique license number. A learner's license may contain a single restriction on it. The person may take his driver's exam at any branch any time before the learner's license expiry date (which is usually set at six months after the license issue date). If he passes the exam, the branch issues him a driver's license. A driver's license must also record if the driver has completed driver's education, for insurance purposes.
- i) Create an E-R diagram following these steps. (5 Marks)
 - ii) Find out the entities and their attributes. (7 Marks)
- b) Customers (CustomerID, CustomerName, CustomerAddress)
Orders (OrderID, OrderDate, #CustomerID)
Products (ProductID, ProductName, price)
Order_products (#OrderID, #ProductID, Quantity)

Create tables Customers, Orders, Products and Order_products using SQL commands.

(8 Marks)

QUESTION FOUR (20 MARKS)

- a) Describe the ANSI/SPARC three level architecture for database management systems software and explain the advantages it provides. (9 Marks)
- b) An engineering consultancy firm supplies temporary specialized staff to bigger companies in the country to work on their project for certain amount of time. The table below lists the time spent by each of the company's employees at other companies to carry out projects. The National Insurance Number (NIN) is unique for every member of staff.

NIN	Contract No	Hours	Employee Name	Company ID	Company Location
616681B	SC1025	72	P. White	SC115	Belfast
674315A	SC1025	48	R. Press	SC115	Belfast
323113B	SC1026	24	P. Smith	SC23	Bangor
616681B	SC1026	24	P. Smith	SC23	Bangor

Normalize the table to 2NF

(8 Marks)

- c) Discuss three benefits of database normalization

(3 Marks)

QUESTION FIVE (20 MARKS)

- a) Diana, a DBA working for a software development company was required to design a database management system.
Required:
- i) Outline five principle requirements he would consider when selecting the storage media for the proposed database system (5 Marks)
- ii) Explain five benefits the proposed database system will deliver to the company (5 Marks)
- b) Discuss, with the help of a diagrams, the database life cycle. (10 Marks)