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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR**  
**FIRST YEAR, SECOND SEMESTER EXAMINATION**  
**FOR THE DIPLOMA IN SOFTWARE ENGINEERING**

**DIT 1007: DATABASE MANAGEMENT SYSTEMS**

**DATE: 6<sup>TH</sup> DECEMBER, 2024**

**TIME: 2:30PM – 4:30 PM**

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE: COMPULSORY (30 MARKS)**

- a) As a software engineer you are commissioned to develop a database system for a coffee manufacturing plant.  
State and explain **FIVE** components of a database system that you will have to consider **(5 Marks)**
- b) Discuss **TWO** of the main differences between the File-based Approach to Data Management and the Database Approach to Data Management. **(2 Marks)**
- c) Define normalization and explain the four normal forms. **(8 Marks)**
- d) Discuss **TWO** goals of database normalization. **(4 Marks)**
- e) Differentiate between Data Control Language (DCL) and Data Manipulation Language (DML) **(2 Marks)**
- f) Define the following terms as used in database systems: **(2 Marks)**
- i. An Entity
  - ii. Data schema
- g) As the Database Administrator of COPAS, you have been asked to create a database that would store information of all the employees, the department where they work, their dependants for the purpose of health insurance amongst other information. Give the SQL statements that you would use to create the database and the three tables. Make sure to enforce the relevant constraints. **(7 Marks)**

**QUESTION TWO: (20 MARKS)**

- a) UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination and final delivery date. Shipped items are received into the UPS system at a single retail Centre. Retail Centres are characterized by their type, unique ID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e. flights, truck deliveries). These transportation events are characterized by a unique schedule Number, a type (e.g. flight, truck) and a delivery route.
- Create an entity-relationship diagram that captures this information about the UPS system. Be certain to indicate the primary key and cardinality elements. **(10 Marks)**
- b) Define RDBMS, and with the help of a well-labelled diagram describe RDBMS Architecture **(4 Marks)**

c) State the use of the following objects in databases:

(6 Marks)

- i. Tables
- ii. Forms
- iii. Queries

**QUESTION THREE: (20 MARKS)**

a) Give the **TWO** parts of SQL and explain the functions of each component.

(4 Marks)

b) State and explain the **THREE** types of relationships in relational databases, using at least for pairs of database tables for each to depict the relationship

(3 Marks)

c) Consider the table “PRODUCTS” shown below:

**PRODUCT**

Product ID	Product Name	Supplier ID	Category ID	Unit	Price
1	Chais	1	1	10	180
2	Chang	1	1	24	190
3	Aniseal syrup	1	2	12	100
4	Sodas	2	2	48	220
5	Match box	2	2	36	250

From the above table, answer the following questions:

- i. Write SQL statement to display all the records in table “PRODUCTS” (2 Marks)
- ii. Write SQL statement to find the price of the cheapest product (2 Marks)
- iii. Write SQL statement to find the total number of all products in the table (2marks)
- iv. Write SQL statement to find the average price of all products (2 Marks)
- v. Write SQL statement to add another product with the following details in the “PRODUCTS” tables (3 Marks)

product ID=6;  
product Name=laptop,  
supplier ID=3,  
category ID=3,  
unit=10,  
price=30000

d) Explain the difference between authentication and authorization as used in database systems (2 Marks)

**QUESTION FOUR: (20 MARKS)**

a) Explain **FIVE** major states that a transaction can undergo (or be in). you may use a diagram to aid your explanation (6 Marks)

b) Given the following health history report:

PET-ID	PET-NAME	PET-TYPE	PET-AGE	OWNER	VISIT-DATE	PROCEDURE
246	ROVER	DOG	12	SAM COOK	JAN 13/2002	01-RABIES VACCINATION
					MAR 27/2002	10-EXAMINE AND TREAT WOUND
					APR 02/2002	05-HEART WORM TEST
298	SPOT	DOG	2	TERRY KIM	JAN 21/2002	08-TETANUS VACCINATION
					MAR 10/2002	05- HEART WORM TEST
341	MORRIS	CAT	4	SAMM COOK	JAN 23/2001	01-RABIES VACCINATION
					JAN 13/2002	01-RABIES VACCINATION
519	TWEEDY	BIRD	2	TERRY KIM	APR 30/2002	20-ANNUAL CHECK UP
					APRIL 30/2002	12-EYE WASH

c) Design relation schemas for

i. 1NF (5 Marks)

ii. 2NF (5 Marks)

d) Discuss four advantages and four disadvantages of DBMS (4 Marks)

### **QUESTION FIVE: (20 MARKS)**

a) Discuss any **FOUR** limitations that were associated with early file-based approach as a method of storing data (6 Marks)

b) Differentiate between authentication and authorization as used in database security (2 Marks)

c) Differentiate between DELETE and TRUNCATE clauses as used in SQL (2 Marks)

d) Provided with the relation below, write an SQL statement to update all employees with level 2 and above with a salary increment of 30%. (6 Marks)

employeeID	Name	Salary	Level
E001	Jones	150,000	4
E002	Phil	15,000	1
E003	Jane	20,000	1
E004	Alicia	50,000	2
E005	Francis	100,000	3

e) In context of database systems, differentiate between the following terms

i. Database & Database Management Systems (2 Marks)

ii. Primary key and candidate key (2 Marks)