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**KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION FOR 2024/2025 ACADEMIC YEAR**  
**END OF SEMESTER EXAMINATIONS**  
**FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE**  
**KCS 2107 INTRODUCTION TO DATABASE SYSTEMS**

**Date: 13<sup>TH</sup> AUGUST, 2024**

**Time: 11:30 AM – 1:30 PM**

**INSTRUCTIONS TO CANDIDATES**

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

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

- a) Write an SQL command to display only the EMPNO and ENAME for employees in the Employee table who are managers and have a commission above 50,000 **(4 Marks)**
- b) The table below shows data from a company database. Normalize the table to 2NF **(6 Marks)**

| Movie-Title | Year | Type     | Director    | Director_DOB | Yr_releases_cnt | Actors             |
|-------------|------|----------|-------------|--------------|-----------------|--------------------|
| Notting     | 1999 | Romantic | Rogers M.   | 05/06/1956   | 30              | Hugh G<br>Rhys     |
| Lagaan      | 2000 | Drama    | Ashutosh G. | 15/02/1968   | 50              | Aamir K<br>Gracy S |

- c) State two integrity constraints among most database applications **(2 Marks)**
- d) A single cause contains several units. Students can enroll in only one course, but they pursue several units in a year, a single lecturer teaches several students and several units but only one Course. Construct an E-R diagram for the registrar's office **(6 Marks)**
- e) Differentiate between physical view and logical view as applied in database. **(4 Marks)**
- f) ABC Company would like to develop a relational database management system. Advise the management on the stages of developing a database system. **(6 Marks)**
- g) Differentiate primary key and foreign key as used in databases. **(2 Marks)**

**QUESTION TWO: (20 MARKS)**

- a) Given the following table:

| EMPNO | ENAME  | JOB       | DEPTNO | COMM   | SALARY |
|-------|--------|-----------|--------|--------|--------|
| 101   | John   | Manager   | 1010   | 25,000 | 70,000 |
| 102   | Mark   | Clerk     | 1010   | 15,000 | 40,000 |
| 103   | Eunice | Secretary | 1085   | 17,000 | 45,000 |
| 104   | Steve  | Analyst   | 2047   | 20,000 | 55000  |
| 105   | Carro  | President | 2001   | 30,000 | 90,000 |
| 106   | Faith  | Security  | 1085   | 5,000  | 10,000 |
| 107   | Adrian | Clerk     | 950    | 17,000 | 40,000 |
| 108   | Lenna  | Manager   | 2047   | 25,000 | 70,000 |
| 109   | Jack   | Clerk     | 1070   | 10,000 | 40,000 |
| 110   | Benuel | Analyst   | 1019   | 21,000 | 55000  |

**Required:**

- i. Write an SQL command to CREATE the above Employee table with EMPNO as the Primary key (Enforce the right constraints for each attribute) **(6 Marks)**
- ii. Write an SQL command to INSERT the first TWO records into Employee table **(4 Marks)**
- iii. Write an SQL command to display the employees whose salary is above 50,000 **(2 Marks)**

- b) Define the term Normalization as used in Database (2 Marks)  
 c) Explain **SIX** reasons for Normalization in a database (6 Marks)

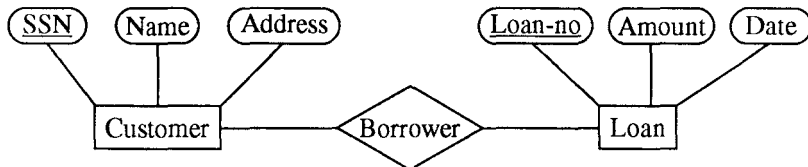
**QUESTION THREE: (20 MARKS)**

- a) Suppose you have been invited to an interview for SQL developer position you had applied for, at company XYZ. The panelists desire to know your knowledge and expertise in dealing with SQL language. As per the interview panel requirements, discuss the terms given below and give two commands it provides.

i. DDL. (4 Marks)

ii. DML. (4 Marks)

- b) Represent the given E-R model in a tabular format (6 Marks)



- c) With the aid of illustrations, describe the Three-Level Database Architecture in database management systems (6 Marks)

**QUESTION FOUR: (20 MARKS)**

- a) Using relational algebra format, write down how to select the employee tuples who's:

i. DEPT\_NO is 10 (3 Marks)

ii. SALARY is greater than 80,000 (3 Marks)

- b) Kiriri university is in the process of computerizing the student data management. You have been approached as a consultant to advice on the issue. Clearly explain why distributing the data would be a better option than consolidating it at one point. (4 Marks)

- c) In the context of databases and data storage systems, a **transaction** is any operation that is treated as a single unit of work, which either completes fully or does not complete at all, and leaves the storage system in a consistent state. Describe the ACID properties of a transaction in distributed database systems. (8 Marks)

- d) Differentiate between TRUNCATING and DELETING a table as used in database programming (2 Marks)

**QUESTION FIVE: (20 MARKS)**

- a) Use the table below to answer the questions that follow.

| Project Code | Project Title   | Project Manager | Project Budget | Employee No. | Employee Name | Department No. | Department Name | Hourly Rate |
|--------------|-----------------|-----------------|----------------|--------------|---------------|----------------|-----------------|-------------|
| PC010        | Pensions System | M Phillips      | 24500          | S10001       | A Smith       | L004           | IT              | 22.00       |
| PC010        | Pensions System | M Phillips      | 24500          | S10030       | L Jones       | L023           | Pensions        | 18.50       |
| PC010        | Pensions System | M Phillips      | 24500          | S21010       | P Lewis       | L004           | IT              | 21.00       |
| PC045        | Salaries System | H Martin        | 17400          | S10010       | B Jones       | L004           | IT              | 21.75       |
| PC045        | Salaries System | H Martin        | 17400          | S10001       | A Smith       | L004           | IT              | 18.00       |
| PC045        | Salaries System | H Martin        | 17400          | S31002       | T Gilbert     | L028           | Database        | 25.50       |
| PC045        | Salaries System | H Martin        | 17400          | S13210       | W Richards    | L008           | Salary          | 17.00       |
| PC064        | HR System       | K Lewis         | 12250          | S31002       | T Gilbert     | L028           | Database        | 23.25       |
| PC064        | HR System       | K Lewis         | 12250          | S21010       | P Lewis       | L004           | IT              | 17.50       |
| PC064        | HR System       | K Lewis         | 12250          | S10034       | B James       | L009           | HR              | 16.50       |

- Normalize the above table to 3NF and correct the redundancies on the resultant tables (8 Marks)

- b) A bus company operates fleet of buses and would like to design the system. The following information shows entities involved in the system.

- Each passenger is booked in one bus.
- A driver can drive more than one bus.
- Buses travel to different destinations.

The buses can be services in any garage owned by the company.

i. Identify entities in the bus company fleet system. (4 Marks)

ii. Use an Entity Relation Diagram (ERD) to show the relationship among the entities. (6 Marks)

iii. Identify at least 4 attributes of each entity. (2 Marks)