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**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR THREE SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE IN
COMPUTER SCIENCE**

COURSE CODE : CSC 316

COURSE TITLE : DATABASE SYSTEM II

DATE: 21/08/2023

TIME: 8.00A.M-10.00A.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

- a) Table 1 is the un-normalised table used by a movie vendor to manage their movie distribution. Normalise the table up to the third normal form [4 Marks]

Name	Physical Address	Movie Title	Title
Jean Zani	Mashujaa Road	The life of a politician Bits and Bytes of Comuters	Ms.
Sam Lemi	Hillsview way	The Valley of Life Cutting the Roses	Mr.
Sam Lemi	Harambee Road	Bits and Bytes of Computers	Mr.

- b) The following narrative is a representation of information about follow. Use it to answer the questions that:

There are multiple banks and each bank has many branches. Each branch has multiple customers. A customer has a name, address that consist of house number, area and city, and one or more phone numbers. Customers have various types of accounts and some customers also have taken different types of loans from these bank branches. Account has number, type and balance. One customer may have multiple accounts and loans.

- i) Identify four entities in the narrative [2 Marks]
 ii) Draw an Entity-Relationship Diagram to represent the information [6 Marks]

- c) A database has a table named Employee. Use the table to answer the questions below:

Emp No.	Employee Name	Salary	DeptNO
K001	Jane	10000	03
K002	Esther	15000	02
K003	Alex	30000	02
K004	John	25000	04
K005	Elvia	30000	01
K006	Hope	75000	02

Write an SQL statement that would:

- i) Count all the employees in DeptNo02 [2 Marks]
 ii) Calculate the average salary of all employees; [2 Marks]
 iii) Calculate the total salary for all employees [2 Marks]
 iv) Display all records for employees where salary is less or equal to average salary of all employees [3 Marks]
- e) With the aid of an example, explain the term functional dependency as used in database normalisation. [3 Marks]
- f) Explain a circumstance under which the modification anomalies may occur in un normalised database [6 Marks]

QUESTION TWO [20 MARKS]

- a) Distinguish between generalisation and specialisation as used to model data in an entity relationship diagram [4 Marks]
- b) Using examples, discuss the layers of transparency that should be provided by a distributed database [8 Marks]
- c) The following are two relations in a database named Persons and orders. Use the information to answer the questions that follows:

Persons table

P_ID	Last Name	FirstName	Address	City
1.	James	Katute	15 Streets	Nairobi
2.	Smith	Nekesa	10 Avenue	Nairobi
3.	Kristen	Oliya	Makuba Street	Kiambaa

Orders table

O_ID	OrderNo	P_ID
1	77895	2
3	22456	2
4	24562	1

- i) With the aid of an example from the table, explain the foreign key constraint in a database [2 Marks]
- ii) Write a SQL statement to:
 - a) Create the above tables with all its constraints [4 Marks]
 - b) Display all the records of the fields P_ID, LastName and OrderNo [2 Marks]

QUESTION THREE [20 MARKS]

- a) Outline Two advantages of using indexes in structured query language [2 Marks]
- b) Describe the Object Oriented data model [2 Marks]

In a college, a lecturer may teach many subjects but may not belong to more than one department. The college maintains information of its lecturer subjects area as follows:

Lecturer number, lecturer name, lecturer grade, department code, department name, subjects codes, subjects name, and subjects level.

- c) Represent this information to 3rd normal form [10 Marks]
- d) Alex is in the process of designing a database. Explain three phases that he should consider during design [6 marks]

QUESTION FOUR [20 MARKS]

- a) Aristocrafty, encountered some challenges when they introduced a distributed database management system. Explain three technical challenges that the company may have faced. [6 marks]
- b) Describe each of the following approaches used in the design of a database
 - i. Top down [2 Marks]
 - ii. Bottom up [2 Marks]
- c) The following is a table named hostelworkers in a database. Use it to answer the questions that follow: [10 Marks]

ID	NAME	HOSTEL	AGE	SALARY	YEARS OF SERVICE
500	Patrick	Red	44	22000	7
510	Dolly	Blue	30	45000	15
520	Sindy	Orange	35	26000	10
530	Lucy	Green	20	44000	12

Write an SQL statement that would:

- i. Sort the hostel table by the name and salary in descending order;
- ii. Find the average salary for all employees
- iii. Find salary more than twenty one thousand and less than thirty thousand and in red hostel
- iv. Display all the records having names with letters 'dy'
- v. Increase salary for all employees by 5%

QUESTION FIVE [20 MARKS]

- a) During a database maintenance session, it was discovered that the data dictionary had malfunctioned.
 - i) Explain 3 the two functions of this data dictionary [2 Marks]
 - ii) Describe any three components of the dictionary [3 Marks]
- b) A database has been scheduled to run automatic update on daily basis. Explain three types of integrity constraints that must be checked during update operation [6 Marks]

Table 2 is an employee table represented in INF. Use it to answer the questions that follow:

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

Table 2: Employee

- a) Justify whether the above employee table is in the 1NF. [2 Marks]
- b) Represent the table in its 3NF [7 Marks]