THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2019 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF COMPUTER AND LIBRARY SCIENCE

REGULAR PROGRAMME

DIT 003: DATABASE SYSTEMS

Date: APRIL 2019	**Duration: 3 Hours**

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

Questions **Q1d, Q3b&4c** are practical questions and therefore should be done on **PC**.

Students **MUST** ensure all the work done on the PC has been successfully saved in their **folders** bearing **APPROPIATE student registration** and submitted for marking at the end of the exam time

The format of naming the folder is **"DIT 003-registration number**" e.g. **DIT 003-1000001** if the student registration number is **1000001**

Q1. a) Explain the **TWO** types of database independence **(4 marks)**

b) The following case study represents a miniworld for stock inventory system. Use it to answer the questions that follow

A store wishes to capture information of their suppliers, the products they sell to their customers and category of the products. A supplier supplies one or many products while a given product can be supplied by one and only one supplier.
A product belongs to one and only one category while a given category can have zero or many products.

Required:
Draw an FRD to represent this information using the **Chen notation.** Primary key and multiplicity constraints must be indicate for each side of the relationship

(6 marks)

c) Differentiate between the following concepts as they apply to database environment

i) degree and cardinality of a relation **(2 marks)**
ii) Primary key & foreign key **(2 marks)**
iii) Optional and mandatory participation **(2 marks)**

d) The following relational schema relates to Jamii Hospital. Use it to answer the questions that follows
Doctor (**DocID**,Name, speciality, email, mobileno)
Patient (**PatID**, name, dob, gender, email, address)
Diagnosis (**ID**,DocID,PatID, symptoms,prescription,DateDiagnosised)
Additional information:
DocID, PatID,ID uniquely identifies all the occurrences for doctor, patient and diagnosis table respectively

Required:

i) Write appropriate SQL statements to implement the above relational schema. All the necessary constraints for each table **MUST** be specified **(6 marks)**

ii) Write appropriate SQL statements to insert the following information

Doctor

DocID	Name	Speciality	Email	mobileNo
D001	Joe	Surgeon	Joe@gmail.com	0774896745
D002	Garry	Atheist	garry@gmail.com	0778342135

Patient

patI D	Name	Dob	Gender	email	address
P001	Gladwell	1997-12-25	Female	Glad@gmail.com	567, MSA
P002	Sean	2000-01-17	Male	sean@gmail.com	4, Nrb

Diagnosis

ID	DocID	PatID	Symptoms	prescription	DateDiagnosed
1	D002	P002	Bacterial infection	Amoxil	2018-10-22
2	D002	P001	Coughing & Fever	Calpol	2017-12-25

(4 marks)

iii) Write an SQL statement to return all diagnosis done from "2018-01-01" up to day. The information to be returned includes patient name, doctor name, doctor speciality, symptoms and prescription given **(4 marks)**

Q2. a) The ISO standard defines five search conditions which can be used in conjunction with WHERE CLAUSE. Explain THREE of them and give an example for each to demonstrate their usage **(6 marks)**

b) A database data model consist of three major components. Explain the role performed by **TWO** of those components **(4 marks)**

c) Discuss attributes under the following classification
   i) Atomic vs Composite **(2 marks)**
   ii) Derived vs stored attributes **(2 marks)**

d) A typical DBMS environment consist of five major components. Explain the role played by **THREE** of these components **(6 marks)**

Q3. a) Early file based approach was faced by a number challenges. Discuss TWO of these challenges and how each occurred **(4 marks)**

b) Use the following snapshot of a database to answer the following questions

Branch

BranchNo	Name	Location
B001	Lavington	Lavington
B002	Kingway	CBD

Staff

staffNo	Name	branchNo
S001	Joe	B001
S001	Sean	B002
S002	Jean	B001

i)

i) Does the staff entity exhibit entity relational integrity? Explain your answer **(1 mark)**

ii) What shall be the effect on both tables as a result of inserting a tuple bearing the branchNo "B003" in the stafftable considering automatic insertion rule? Explain your answer **(2 marks)**

iii) What shall be the effect on both tables in case a user deletes the tuple bearing the branchNo "B001" from the branch table considering cascade delete rule? Explain your answer **(2 marks)**

iv) Write appropriate SQL statement to implement the two tables. For each table, include the appropriate constraints in the table definition. **(3 marks)**

v) write appropriate SQL statement to insert at least a tuple for each of the table **(2 marks)**

(Save all the SQL statements for this question as Q3b)

c) Discuss any **THREE** domain information associated with attributes. For each, use an example of your choice to demonstrate how SQL implements it **(6 marks)**

Q4. a) Discuss any **THREE** ways of classifying DBMS **(6marks)**

b) There are **THREE** types of integrity constraints that can be implemented by a Relational Database Management System (RDBMS). Explain **TWO** of those integrity constraints **(4 marks)**

c) From the schema created in Q1d, write appropriate SQL statements to

i) Update the specialty of doctor "D002" from atheist to Pediatrician **(2 marks)**

ii) Add a new column named "location" for doctors table **(2 marks)**

iii) Return all diagnosis which contain "fever" in their symptoms **(2 marks)**

d) Explain the **TWO** major category of database users specifying the role each plays **(4 marks)**

Q5. a) Discuss the ANSI-SPARC architecture indicating the kind of information captured in each of the level. Include a well labeled diagram for the same **(7 marks)**

b) Discuss two positive and negative impacts of adopting database system for your organization **(4 marks)**

c) An upcoming computer shop wish to computerize their data storage activities. The performed user requirements and came up with the following list of requirements.

Data shall be captured about the customers who buy their computer systems. For this, they will capture CustomerNo, customerName, email, mobile number, gender and location. The CustomerNo number uniquely identifies each customer. Customers name shall be stored as Sur name and Other names.

Data shall also be captured about the computer they sale to customers. For this, they shall capture serialNo, specifications, manufacturerName and price for the computer. TheserialNo uniquely identifies each computer. A customer can buy oneor many computers while a given computer can be bought by zero or more customers. Information to be captured about buying process includes customer information, computer information, time of buying, date of purchase and the quantity bought.

The organization also wishes to capture the suppliers who supply them with computers. Information to be capture about suppliers include supplierID, supplierName, email, mobile and location. A supplier can supply zero or many computers while a given computer can be supplied by zero or one supplier. ThesupplierID uniquely identifies each entity occurrence.

REQUIRED:

Using CROW FEET NOTATION, represent the above information by drawing an appropriate ER diagram. Primary keys, foreign keys and multiplicity constraints MUST be indicated. **(9 marks)**

END