UGANDA BUSINESS AND TECHNICAL EXAMINATIONS BOARD

PAPER CODE	PROGRAMME	DATE
TDIT123	NATIONAL DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY YEAR I SEMESTER II	THURSDAY, 25TH MAY 2023
SERIES	**PAPER NAME**	**TIME ALLOWED**
APRIL/MAY 2023	DATABASE PLANNING, DESIGN AND MANAGEMENT I	3 HOURS

YOU SHOULD HAVE THE FOLLOWING FOR THIS EXAMINATION

Answer Booklet

INSTRUCTIONS TO CANDIDATES

1. *This paper consists of **eight** questions.*
2. *Answer **only five** questions.*
3. *All questions carry equal marks.*
4. *All answers to each question should begin on a fresh page.*
5. ***Do not** write anywhere on this question paper.*
6. *All rough work should be done in the official answer booklet provided.*
7. *Read other instructions on the answer booklet.*

Question One (02 marks)

(a) Define the term **database.**

(b) Uganda Technical College – Soroti is in the process of developing an integrated database system and you have been consulted as a student of database planning, design and management.

(i) List **two** examples of database management systems to be used. (02 marks)

(ii) State **four** advantages that the school will derive from using the integrated database system. (08 marks)

(c) Describe **four** components of a database management system. (08 marks)

Question Two

(a) Distinguish between a **conceptual** model and a **logical** model. (04 marks)

(b) The data model below was designed by Jayden's company to represent employee's information in the database.

Employee

Emp_id	Emp_name	Emp_dep't	City
W001	Kulumba j	Ict	Lira
W003	Hawa m	null	Gulu
W004	Koyinanga	Admin	Mbale

(i) Identify the type of data model used above. (02 marks)

(ii) Give **four** reasons to support your answer in 2(b)(i). (04 marks)

(iii) Briefly explain the representation of "null" in the data model "Employee". (02 marks)

(c) Explain **four** other data models that can be used to represent data in a database. (08 marks)

Question Three

You have been consulted to guide the company on database planning and management at Bevor Uganda Ltd that has recently restructured its operations and created several departments. Each department has a number of employees, these employees are in a group of ten and each group is headed by one or two supervisors from different department.

(a) Outline **two** types of attributes stored. (02 marks)

(b) Identify **three** entities. (03 marks)

(c) Identify the type of relationship between the entities identified. (03 marks)

(d) Represent the information using an **E-R** diagram. (12 marks)

Question Four

(a) The relation below was rejected for storage during upload into the sports database.

Table1:

Pid	Name	sports	Address	Hire date	Expiry date	Salary	Sport_id
Pl100	Juma k	Soccer Athletics	P.O box 40, lira P.O box 60, jinja	1/2/2000 3/6/2010	4/6/2007 7/8/2019	50000 60000	D40 D50
Pl200	Will M	Soccer Swimming Music	P.O box 40, lira P.O box 80,Ike P.O box 60, jinja	1/9/2002 1/1/2004 1/11/2005	10/6/2003 1/12/2004 10/8/2006	50000 37500 60000	D40 D93 D93

(i) In which database form is the table "players". (02 marks)

(ii) State **one** problem associated with the "players" table. (02 marks)

(iii) Explain **two** ways how the anomaly in "Table 1" can be solved. (04 marks)

(iv) Using one of the methods in 4(a)(iii), generate a table that is free of the problem in 4(a)(i). (06 marks)

(b) In a college database, staff_id functionally determines the position of a staff member. Illustrate this relationship using a functional dependency diagram. (06 marks)

Question Five

Your company has won a bidding to design a database for the ministry of education and sports. For quality output, the systems administrator has advised you to follow every activity all the stages of the database application life cycle.

(a) Explain one activity performed at each of the following stages. (02 marks)

(i) Planning. (02 marks)

(ii) Systems definition. (02 marks)

(iii) Requirements collection and analysis. (02 marks)

(b) Give **two** types of requirements you will use to design the database. (12 marks)

(c) Explain **six** factors considered while selecting a DBMS system.

Question Seven

(a) Distinguish between **top down** and **bottom up** approaches in database design. (04 marks)

(b) Billa college started the registration of candidates, using candidates approved list, the registration number are input into the system and if the registration number is wrong, the name is used as input. Upon finding the correct registration number, the candidate's documents are verified and if the academic documents don't meet the required standard the candidate is rejected else the candidate is registered and his/her exam id is generated. As a database designer, use the **flowcharts** to represent the steps of registration at this college. (10 marks)

(c) Explain **three** factors that lead to successful database design. (06 marks)

Question Six

You are a member of database discussion group that is trying to identify the projects that will solve the problems in the East African Community.

(a) Distinguish between a **strong** and **weak** entity. (02 marks)

(b) Explain **five** application areas of database management system. (10 marks)

(c) Discuss **four** data types used in databases. (08 marks)

Question Eight

(a) Differentiate between **entity integrity** and **referential integrity**. (04 marks)

(b) The instance information below was specified to you by a client for inclusion in his company new database.

Branch (branchNo, street, city, postcode)

Staff (staffNo, fName, lName, position, sex, DOB, salary, branchNo)

(i) Identify the **primary key** for each of the instances. (02 marks)

(ii) Generate tables that will store each of the above instances in the client's database. (04 marks)

(iii) For each of the tables in 8(ii), state its degree. (02 marks)

(iv) Explain **three** measures you would put in place to ensure database security. (06 marks)

END

Question One

(a) Define **file organization** as applied in databases. (02 marks)

(b) State **three** types of index in databases. (03 marks)

(c) Describe **three** types of file organizations in a database. (06 marks)

(d) Explain **three** guidelines used for selecting one of the file organization in 1(c). (09 marks)

Question Two

A database designer has proposed that your company should change the architecture of their database from File-server to Client-Server. As an IT expert in your company;

(a) Explain to the management **three** differences between the two architectures. (06 marks)

(b) Suggest **four** reasons to justify the designer's proposal. (08 marks)

(c) Describe **three** components of a database management system and how they relate to each other. (06 marks)

Question Three

A company has a number of buses which operate in different routes. The company wants to create a database to keep information about these routes. Each route is assigned a code. The total length (in km.), the source and the destination of each route is stored. Each bus has a unique number plate, a model, and its capacity. Each bus is allocated a driver whose name, gender and a unique identification number are stored.

(a) Identify **three** main Entity types for the company. (03 marks)

(b) For each of the entities above, identify two **Attributes** and the **Primary keys**. (08 marks)

(c) Using your data in 3 (a) and (b), draw an **Entity Relation Diagram** to represent the data requirements for the company. (09 marks)

Question Four

(a) Define a **Database Management System** (DBMS). (02 marks)

(b) Explain **four** importance of the Database Management System (08 marks)

(c) Describe **five** factors which the company should consider while selecting a database management system. (10 marks)

Question Five

(a) Distinguish between **Data Definition Language** (DDL) and **Data Manipulation Languages** (DML) as used in database management systems. (04 marks)

(b) The ministry of ICT recently advertised for the positions of Data Administrator, Database Administrator and Database Applications Developer. Describe the role performed by each of the personnel. (06 marks)

(c) Explain **five** benefits an organization can get from using a database management system. (10 marks)

Question Six

(a) Define the term **Normalization**. (02 mark)

(b) Explain **four** objectives of normalization in database design. (08 marks)

(c) Define **functional dependency** as used in normalization. (02 marks)

(d) Describe the following levels of normalization

(i) 1NF (02 marks)

(ii) 2NF (03 marks)

(iii) 3NF (03 marks)

Question Seven

(a) Explain the following terms;

(i) Recursive Relationships (02 marks)

(ii) Data Independence (02 marks)

(iii) Data Consistency (02 marks)

(iv) Data Integrity (02 marks)

(b) The management of a sports club is developing a database system to store its' members personal details and records of attendance. They were informed that a relational database management system can be implemented. The management approached you to examine its system and you noticed that no **validation method** was implemented.

(i) Describe **two** methods of validation that can be used in such a system. (04 marks)

(ii) Explain **four** reasons why members of the sports club should be consulted before finalizing such a system. (08 marks)

Turn Over

Question Eight

(a) Distinguish between **Degree** and **Cardinality** as used in databases. (04 marks)

(b) The data model below was designed to describe data and relationships between data of an organization.

Department

DEPTNO	DEPTNAME	DEPTLOCATION
D01	sales	Gulu
D02	IT	Jinja
D03	Marketing	
D04	Research	Kampala

Employees

EMP_ID	EMP_NAME	TITLE	DEPTNO
E01	John	Manager	D04
E02	Paul	HRM	D03
E03	Linda	Clerk	D04

(i) Identify the data model used by the organization above. (02 marks)

(ii) State **four** characteristics of the model identified in 8 (b) (i). (04 marks)

(iii) Using the models in part 8 (b) (i), explain the difference between a **Primary key** and a **Foreign key** and give an example of each. (06 marks)

(iv) Explain **two** other data models that can be used to describe data apart from the one in 8 (b) (i). (04 marks)