061306T4CSC

COMPUTER SCIENCE LEVEL 6

ICT/OS/CS/CR/05/6/A

DEMONSTRATE DATABASE MANAGEMENT SKILLS

NOV/DEC 2023

TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

WRITTEN ASSESSMENT

TIME: 3 Hours

INSTRUCTIONS TO CANDIDATE

1. *The paper consists of **two** sections: **A** and **B***
2. *Answer **ALL** questions in Section **A** and any **Three** from section **B***
3. *Marks for each question are indicated in the brackets*
4. *A separate answer booklet will be provided*
5. *Do not write on the question paper*

Candidates should answer the questions in English

This paper consists of FOUR (4) printed pages

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A: (40 Marks)

(Answer ALL the questions in this section)

1. Define each of the following terms as used in database: (4 Marks)
    a) Database Management System (DBMS)
    b) Record
    c) Field
    d) Relational Model
2. The Milk Cooperative society has contracted you to create a modern application. Outline FOUR reasons for incorporating a database within an application (4 Marks)
3. Write an SQL statement to create a table named “Students” with three columns configured to disallow null values (3 Marks)
4. Explain the difference in functionality between foreign key and primary key (4 Marks)
5. During the process of database creation, explain any TWO requirements for collecting the information about the database. (4 Marks)
6. The properties of a table collectively define the structure of a relation in a database. List THREE properties of a table. (3 Marks)
7. Explain TWO reasons why the relational model is more popular than the other database models. (2 Marks)
8. Outline FOUR advantages of implementing OODBMS over the RDBMS. (4 Marks)
9. Explain the function of the following terms in a database management system:
    a) Data manipulation language (2 Marks)
    b) Data definition language (2 Marks)
10. Write an SQL query to retrieve data from an "employees" database and display the results to the database user. (4 Marks)
11. Explain FOUR data manipulation query statements in Microsoft SQL Server and their respective uses. (4 Marks)

SECTION B: (60 Marks)

(Answer any THREE questions in this section)

12.

a) You have a database table with the following fields: Vehicle_ID, Vehicle_Name, Price, and Description. Perform the following;

   i. Select a suitable primary key and explain why you made this choice (2 Marks)

   ii. Write an SQL command to insert a record into this table. (4 Marks)

   iii. Write an SQL command to delete a record from this table. (3 Marks)

   iv. Write an SQL command to view all records in the table. (3 Marks)

b) Describe the validation of E-R model according to the requirements and specified transactions using CRUD matrix. (8 Marks)

13.

a) Learning institution maintains the details of its lecturers who are teaching various units as follows. PF_NO, Name, Grade, Department_code, Department_Name, Subject_code, Subject_name and Subject_level. Each lecturer may teach many subjects but cannot belong to more than one department. Perform the following:

   i. Normalize this data up to 2^{nd} normal form. (6 Marks)

   ii. Draw an entity relationship diagram for this case. (5 Marks)

b) You have been selected for a government internship in the fertilizer subsidy program and assigned to the records office. Your supervisor has asked you to create a system for managing NCPB branch files, a task that involves a complex file retrieval process. Given your background as a computer scientist, you've offered to develop a database. Explain THREE key phases in the process of designing this database. (9 Marks)

14.

a) The SQL joins are essential for complex querying and reporting in databases. Discuss FOUR types of SQL joins. (8 Marks)

b) The object-oriented databases provide a flexible and powerful way to model and store complex data structures, making them well-suited for applications that deal with complex relationships and dynamic data. Explain the FOUR main concepts of object-oriented databases. (8 Marks)

c) Explain FOUR objectives of a distributed DBMS (4 Marks)

15.

a) State TWO differences between dense and sparse indexes. (4 Marks)

b) Explain THREE areas where data mining concept may be used to discover patterns and trends from large and complex datasets. (6 Marks)

c) Explain each of the following terms as used in databases: (4 Marks)

i. Views

ii. Triggers

d) Mapping and navigation systems are used in transportation to identify the position of vehicles in real-time. This application implements spatial and geographical databases. Describe THREE features of spatial and geographical databases. (6 Marks)

THIS IS THE LAST PRINTED PAGE.