PAC INSTITUTE OF TECHNOLOGY AND SOCIAL STUDIES
SEPTEMBER – DECEMBER 2024 ASSESSMENT

FORMATIVE ASSESSMENT

Qualification Code : ICT/OS/CS/CR/05/6/A

Qualification : Demonstrate Database Management Skills

Code : ICT/CU/CP/CR/04/6/A

Unit of Competency : DESIGN AND DEVELOP DATABASES

WRITTEN ASSESSMENT
TIME: 3 HOURS

INSTRUCTIONS TO THE CANDIDATE:

1. *Read all the instructions carefully before attempting the questions.*
2. *This paper consists of two sections, A & B.*
3. *You are allowed 3 Hours to Answer the questions.*
4. *Marks for each question are indicated in brackets.*
5. *Write your responses in the Separate Answer booklet provided.*
6. *Do not write anything on this question paper.*

SECTION A: 40 MARKS

Answer ALL questions in this section.

1. Databases consist of several key components that work together to organize, manage, and access data efficiently. State **FOUR** such components. (4 Marks)

2. SQL commands are often categorized based on the type of operation they perform within a database. Outline the **FOUR** types of these commands. (4 Marks)

3. A good database system is crucial for efficiently managing and storing data, ensuring data integrity and providing reliable and secure access to information. Outline **FOUR** characteristics one would consider to achieve this. (4 Marks)

4. In the context of a database, differentiate between database schema and database instance. (4 Marks)

5. In SQL, the ALL operator is used in conjunction with certain comparison operators to compare a value with all values in a set. State **THREE** statements that are usually associated with SQL ALL operator. (3 Marks)

6. Define the term variable in databases. (2 Marks)

7. The database testing process typically involves several key steps to ensure the accuracy, reliability and performance of the database system. Outline the **THREE** step database test process. (3 Marks)

8. Transaction mechanisms and concurrency mechanisms are essential aspects of database management systems (DBMS) that ensure data consistency and enable efficient multi-user access to the database. **Differentiate** between transaction mechanisms and concurrency mechanisms. (4 Marks)

9. Derived and stored are examples of data attributes used in a database, Outline **TWO** differences between the two. (4 Marks)

10. Define the term database dictionary. (2 Marks)

11. Normalization is a process in database design that organizes tables and attributes in a database to minimize redundancy and dependency. Outline **FOUR** advantages of normalization. (4 Marks)

12. In database design, relationships are used between different tables to represent how the data in one table is related to the data in another. State **TWO** types of database relationships. (2 Marks)

SECTION B: 60 MARKS

*Attempt any **THREE** questions in this section.*

13.

a) Table 1 shows employee records stored in a database. Use it to answer the question

that follows.

Employee No	First name	Last name	Date employed	Salary	Grade
1010	Walter	Williams	11/11/2009	10000.09	Lower
1011	Jane	Antony	09/11/2007	20000.56	Higher
1012	Nicholas	Kings	06/06/2008	25000.67	Higher
1013	Mary	Anne	05/10/2008	15000.45	Middle
1014	Johnstone	Pielly	12/12/2009	11000.99	Lower

Table 1: Employee

Write SQL statements that would:

i) Extract the first names in uppercase and last names; (3 Marks)

ii) Extract the first three characters of the Grade and store them in a field named grade 1; (3 marks)

iii) Determine the number of characters in the last name and store them in the field named last name size; (3 Marks)

iv) Round off the values in the salary field to 0 decimal places and store them in the field named sal. (3 Marks)

b) Transaction processing involves the management of transactions that consist of multiple operations on a database. Explain the acronym **ACID** as used in transaction processing. (8 Marks)

14.

a) Database backups are essential for data protection and recovery in the event of data loss, corruption, or system failures. Explain **THREE** types of databases back up (6 Marks)

b) Rules and guidelines are used to define the allowable characteristics and relationships of data in database tables. Explain **TWO** advantages of constraints in a database. (4 Marks)

c) Database design methodology involves a systematic approach to creating a database structure that meets the requirements of an organization or application. Discuss **THREE** main phases of database design methodology. (6 Marks)

d) Distributed systems are composed of multiple autonomous computers that communicate and coordinate their actions through a network and designed to provide a unified service. Outline **FOUR** characteristics of such system. (4 Marks)

15.

a) In the context of database design, an atomic attribute and multivalued attribute are types of attributes that represent different characteristics of data. What is their difference? (4 Marks)

b) Describe **THREE** constraints used to enforced data consistency in database relationship. (6 Marks)

c) You have been contracted to create a library system for ABC College. In this system, a student is identified by a Student number and name. A student can borrow a maximum of three books. Each book is identified by an ISBN and BookName. Many students can borrow many books. Every borrow transaction is recorded using StudentNo, Date Borrowed and Return date. Identify the entities in this system and the respective attributes. (10 Marks)

16.

a) The following car details are to be entered in a database: Make, date of manufacture, color and cost.

i) Prepare a suitable database structure showing field names and their field types. (5 Marks)

ii) Explain how one can index the data such that cars of the same make and colors are together. (2 Marks)

iii) Write statements that can be used to select cars of the color green whose cost is greater than Ksh. 500,000. (3 Marks)

b) Salim intends to perform tests on the data in a database system. Explain any **THREE** types of database tests that he can perform. (6 Marks)

c) Juma works for a data company that has been storing their files using physical files. The company intends to switch to using a database management system to store their data. Explain **TWO** benefits the company may realize from implementing the new system. (4 Marks)