Level 5 Diploma in Database Administration (990) 171 Credits

Unit: Introduction to SQL **Exam Paper No.:** 5	**Guided Learning Hours:** 200 **Number of Credits:** 20
Prerequisites: Basic technological knowledge and ability to work on own initiative	**Corequisites:** Confidence in using computer.
Aim: Relational databases are everywhere. This is one of the tech skill that demands attention. SQL spans continents, countries, industries, and drive businesses and schools, hospitals and nonprofits, research and applications. Apart from working as database developer, but one can also find job postings as business analyst, data scientist, data engineer; including in financial industry which requires a solid foundation in SQL. In this course, learners will be using PostgreSQL as the database. The knowledge gained can easily be used in Microsoft SQL Server and Oracle; however, there are minor differences between.	
Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: This is a hands-on unit, hence practical use of computers is essential. Requires intensive lab work outside of class time.	
Intended Learning Outcomes:	**Assessment Criteria:**
1. Understand what relational database and SQL is; including the different types/favours of SQL.	1.1 Describe the role of SQL in extracting, loading and transforming data. 1.2 Define relationship between SQL and database. 1.3 Outline different SQL programmes. 1.4 Demonstrate how to install PostgresSQL. 1.5 Be able to install a sample database. 1.6 Explore Postgres layout. 1.7 Describe entity relationships.
2. Understand the SQL syntax, queries and clauses; in order to be able to relate between telling the database what is needed and what database returns.	2.1 Describe declarative programming. 2.2 Define purpose of Select Query Tool. 2.3 Demonstrate the SELECT/FROM clauses. 2.4 Demonstrate the use of ORDER BY. 2.5 Be able to sort database results. 2.6 Demonstrate filtering with WHERE, AND *and* OR. 2.7 Demonstrate filtering with IN/NOT IN, LIKE/NOT LIKE. 2.8 Demonstrate filtering with greater than, less than, not equal to and BETWEEN. 2.9 Demonstrate the use of DISTINCT, COUNT and GROUP BY. 2.10 Describe aggregate function. 2.11 Be able to evaluate logical processing order of SELECT statements. 2.12 Demonstrate how to comment and describe importance of comment in programming.
3. Understand why databases have many tables and how to identify relationships between them.	3.1 Define primary/foreign keys. 3.2 Explain referential integrity in databases.

	3.3 Describe Venn diagrams in relation to table joins. 3.4 Explain different types of SQL table joins. 3.5 Demonstrate implementation of SQL OUTER, INNER and CROSS joins.
4. Understand the purpose and implementation of functions in aggregating data; including the questions they answer/solve.	4.1 Demonstrate the use of SUM, AFG, MIN, MAX, TRUNC and ROUND. 4.2 Describe a sub-query. 4.3 Be able to use SQL sub-queries. 4.4 Identify operators used with sub-queries. 4.5 Be able to combine SQL statements using UNION and UNION ALL.
5. Understand various data types supported in SQL and the differences between them.	5.1 Demonstrate how Booleans, text, numbers and dates are used in SQL. 5.2 Describe arrays. Define JavaScript Object Notation (JSON). 5.3 Describe Universally Unique Identifiers (UUIDs). 5.4 Be able to use date and time functions. 5.5 Describe SQL string manipulation functions. 5.6 Demonstrate the use of CASE statement.
6. Understand how to create tables in a database, how to insert data; including updating and deleting data/tables.	6.1 Demonstrate how to create a table. 6.2 Demonstrate how to insert data into a table. 6.3 Demonstrate how to update table data. 6.4 Demonstrate how to delete data/table. 6.5 Be able to install/create a database.
7. Understand what "*Analytic Functions*" are and how they perform calculations against a set of rows to return an aggregated value.	7.1 Describe cumulative value calculations. 7.2 Be able to calculate rank row. 7.3 Describe how to perform year/month/week calculations. 7.4 Explain RANK and ROW_NUMBER analytic functions. 7.5 Describe the use of LEAD and LAG functions. 7.6 Describe use of temporary tables. 7.7 Describe pivot and unpivot in SQL.
Methods of Evaluation: A 2½-hour written examination paper with five essay questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake coursework/projects in Introduction to PostgreSQL.	

Recommended Learning Resources: Introduction to PostgreSQL

Text Books	• Data Analysis Using SQL and Excel by Gordon S. Linoff. ISBN-13 : 978-1119021438 • PostgreSQL Query Optimization by Henrietta Dombrovskaya, Boris Novikov, Anna Bailliekova. ISBN-13 : 978-1484268841 • PostgreSQL Configuration by Baji Shaik. ISBN-13 : 978-1484256626
Study Manuals	BCE produced study packs

CD ROM 	Power-point slides
Software 	Postgres