CHUKA UNIVERSITY

EXAMINATION FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE Y4S1

COSC 451: ADVANCED DATABASE SYSTEMS

DATE: **TIME: 2 HRS**

INSTRUCTIONS:

Answer Question ONE and ANY other TWO Questions

Question One (30 Marks)

a) Give the syntax for creating an index in SQL. **(1 Marks)**

b) What is a query tree? **(1 Marks)**

c) Differentiate between a relationship and a relation in a database model. **(3 Marks)**

d) Explain three goals and threats of database security. **(3 marks)**

e) State and explain four characteristic of distributed DBMS. **(4 marks)**

f) With the aid of diagram describe the query optimizer architecture. **(5 marks)**

g) What is an index in file organization? Explain two reasons why we need indexes in file organization. **(3 Marks)**

h) With the help of a diagram, discuss the process of moving data from various sources into the data warehouse. **(5 Marks)**

i) Write the SQL to list all employees whose name begins with an 'S'. **(5 Marks)**

Question Two (20 Marks)

a) Describe the difference between an equi-join and a non-equi join. **(3 Marks)**

b) List the factors to be considered in evaluating an index. **(5 Marks)**

c) With an aid of an illustration explain the difference between B+ tree and Clustered indexing as applied in DBMS. **(6 Marks)**

d) Explain the steps in query processing. **(6 Marks)**

Question Three (20 Marks)

a) With the aid of a diagram, discuss the multi-dimensional data model of the data warehouse. **(4 Marks)**

b) Write the SQL to list the average salary for each job type. Do not display the average if it is less than 2000. **(5 Marks)**

c) Write a relational algebra expression equivalent to b) above. **(5 Marks)**

d) Kibe is developing a Database for her client. The client needs a less secure system because they would spend less money. Can you advice the client of Kibe on the needs to have a strong database security. **(6 marks)**

Question Four (20 Marks)

a) With the help of a diagram, discuss the three-tier architecture of the client-server architecture. **(4 Marks)**

b) Differentiate between Database, Data warehouse, data Mart and data Mining. **(8 Marks)**

c) Convert the following SQL query into a relational algebra expression tree that places σ and π operators so as to minimize the amount of data the system must process. **(8 Marks)**

select C.name, sum(L.extPrice) sales from LineItem L, Orders O, Customer C, Nation N where L.oid=O.oid and O.cid=C.cid and C.nid=N.nid and N.name = 'Canada' and O.orderdate > '2010-12-31' and julianday(L.shipdate) - julianday(O.orderdate) > 90 group by C.name having average(L.qty) < 10 order by sales desc

Question Five (20 Marks)

a) Describe the advantages and disadvantages of indexes. **(6 Marks)**

b) Differentiate between Homogeneous and Heterogeneous. **(4 marks)**

c) State and explain five steps of data transformation. **(5 marks)**

d) You have been recently employed as a database expert by G.D.C which uses Modern DBMS. Briefly explain any five characteristics of Modern DBMS. **(5 Marks)**