CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COSC 451: ADVANCED DATABASE SYSTEMS

STREAMS: BSC (COMP. SC) Y4S2 **TIME: 2 HOURS**

DAY/DATE: THURSDAY 23/09/2021 **8.30 A.M – 10.30 A.M.**

INSTRUCTIONS:

- **Answer question ONE and ANY other TWO questions.**

Question one (30 Marks)

a) Explain the term indexing as applied in database systems. (2 Marks)

b) Differentiate OLTP and OLAP. (4 marks)

c) Explain ETL in the context of data warehousing. (2 marks)

d) Describe the difference between an equi-join and a non-equi join. (4 Marks)

e) Describe the advantages and disadvantages of indexes. (4 Marks)

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

g) Write the SQL to list the average salary for each job type. Do not display the average if it is less than 2000. (4 Marks)

h) Write a relational algebra expression equivalent to h) above. (4 Marks)

Question two (20 Marks)

a) Discuss any four components of a data warehouse. (4 marks)

b) Organizations using computer applications systems are constantly faced with the deliberate theft or criminal destruction of computerized data or services, the use of

hardware, software or data for illegal activities, or the illegal use of computers. Discuss threats and risks of store data or data in transit and outline the strategies to self-shield and mitigation efforts an organization may employ. (8 marks)

c) Explain the steps involved in cost-based query optimization. (8 Marks)

Question Three (20 Marks)

a) Outline three steps of SQL query processing and optimization.

b) Use query optimization trees to illustrate optimization as applied in Database system. (9 Marks)

c) Describe each of the following concepts of data warehousing. (8 Marks)

i. Subject orientation concepts
ii. Integral concept
iii. Time variant concept
iv. Non-volatile concept.

Question Four (20 Marks)

a) Describe the structures and rules governing each of the following DBMS models .(6 marks)

i. Hierarchical database model
ii. Relational database model
iii. Network database model

b) with an aid of an illustration in each case explain the use of the following OLAP processes: (8 Marks)

i. Drill-down
ii. Slicing

c) Data Ware house adopt different models discuss them? (6 Marks)

Question Five (20 Marks)

a) With the aid of a diagram describe a three tier client server architecture? (4 Marks)

b) You have been recently employed as a database expert by ABC which uses Modern DBMS. Briefly explain any eight characteristics of Modern DBMS. (8 Marks)

a) 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

---