

CHUKA



UNIVERSITY

SUPPLEMENTARY / SPECIAL EXAMINATIONS

**FOURTH YEAR EXAMINATION FOR THE AWARD OF BACHELOR DEGREE IN
COMPUTER SCIENCE**

COSC451: ADVANCED DATABASE SYSTEMS

STREAMS: Y4 S1

TIME: 2 HOURS

DAY/DATE: TUESDAY 17/11/2020

11.30 A.M – 1.30 P.M.

INSTRUCTIONS:

Question number 1 is compulsory. Answer any two questions from the rest.

SECTION A (30 MARKS)

QUESTION 1

- a) Define the following terms as applied in database systems: (4 Marks)
 - i. Relational algebra
 - ii. Schema
 - iii. Indexing
 - iv. Query processing
- b) State four reasons why query optimization is important. (4 Marks)
- c) Differentiate between database and data warehouse. (4 Marks)
- d) Distinguish between data security and data integrity. (4 Marks)
- e) Explain the following joins as applied in relational algebra: (6 Marks)
 - i. Equijoin
 - ii. Inner Join

iii. Natural Join

- f) Write the relational algebra version of the following SQL expression: (5 Marks)
Select regno, Surname OthernamesFrom studentWhere DOB > 20/3/1988
- g) Explain encapsulation, inheritance and polymorphism as in object databases. (3 Marks)

Question 2

- a) Differentiate between OLTP(online transaction processing) and data warehousing.(6 Marks)
- b) Describe any four datamining techniques. (8Marks)
- c) With the aid of a diagram, discuss the multi-dimensional data model of the data warehouse. (6 Marks)

Question 3

- a) Data warehousing comes with a number of benefits. Explain five of these benefits. (5 Marks)
- b) Consider the following schema:

Suppliers (sid : integer, sname : string, address : string)

Parts (pid : integer, pname : string, color : string)

Catalog (sid : integer, pid : integer, cost : real)

- i. The key fields are underlined and domain of each field is listed after the field name. (2 Marks)
- ii. Find the name of suppliers who supply some red parts. (2 Marks)
- iii. Find the sids of suppliers who supply some red or green parts. (2 Marks)
- iv. Find the sids of suppliers who supply some red part or are at 221 packer Ave. (2 Marks)
- v. Find the sids of suppliers who supply some red part and some green part.(2 Marks)
- vi. Find the sids of suppliers who supply every part. (2 Marks)
- vii. Find the sids of suppliers who supply every red part. (2 Marks)
- viii. Find the sids of suppliers who supply every red or green part. (2 Marks)

Question 4

- a) Explain any four types of complex applications that prompt the use of object databases instead of relational databases. (8 Marks)
- b) State and explain three goals and threats of database security. (6 marks)
- c) Explain the use of the following OLAP processes:
 - (i) Drill-down (2Marks)
 - (ii) Consolidation (2Marks)
 - (iii) Slicing (2Marks)

Question 5

- c) State and explain two characteristic of distributed database management system (4 Marks)
 - d) With the aid of diagram describe the query optimizer architecture. (8 Marks)
 - e) With aid of an example differentiate between clustered index and non-clustered indexing. (4 Marks)
 - f) With the help of a diagram, discuss the process of moving data from various sources into the data warehouse. (4 Marks)
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