

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF SCIENCE APPLIED COMPUTER SCIENCE**

ACSC352: FILE STRUCTURES AND DATABASE SYSTEMS**STREAMS: BSC (ACSC)****STREAMS: 2 HOURS****DAY/DATE: MONDAY 06/04/2020****11.30 AM – 1.30 PM****INSTRUCTIONS:**

1. Answer **all questions** in section A and any other **two questions** from section B.
2. No Reference Material is allowed in the exam Room.
3. All Mobile phones should be switched off in the exam room.
4. Write legibly.

SECTION A (COMPULSORY)**QUESTION 1 (COMPULSORY) [30 MARKS]**

- a) With regard to databases, explain the following terminologies: -
 - i) File structures
 - ii) Concurrency control
 - iii) Query optimization
 - iv) Database serialization (6marks)
- b) Explain four failures that would necessitate database recovery (4marks)
- c) Outline three major types of database concurrency control techniques. (3marks)
- d) Explain THREE benefits of replication in distributed databases(6marks)
- e) Explain two benefits of search engines in information retrieval, naming six examples of search engines available on the internet. (5 marks)
- f) Explain what is checkpointing, hence Outline the procedure of performing fuzzy checkpointing (6marks)

SECTION B (Answer two question from this section)**QUESTION 2 [20 MARKS]**

- a) Using the help of diagrams, explain the following indices
- i) Sparse index (3marks)
 - ii) Dense index (3marks)
 - iii) Multilevel index (3marks)
- b) Outline THREE steps of SQL query processing and optimization. Ensure to include query optimization trees to illustrate optimization. (7marks)
- c) Explain TWO measures of query cost (4marks)

QUESTION 3 [20 MARKS]

- a) Differentiate between simple and interleaving schedulers in database serializability (2marks)
- b) Using an example, explain FOUR concurrency control lock based protocols (8marks)
- c) With regard to spatial databases
- i) Explain what is a spatial database (2 marks)
 - ii) Outline TWO data types usable in spatial databases (4 marks)
 - iii) Explain two differences between spatial databases and genome databases (4marks)

QUESTION 4 [20 MARKS]

- a) With reference to database transactions. Answer the following questions.
- i) Taking two instructions I_1 and I_2 of transactions T_1 and T_2 . Using four sets of instructions, demonstrate how there could exist a conflict in the transactions T_1 and T_2 . (4 marks)
 - ii) Using conflict serializable, illustrate how the transactions in (i) above can be resolved to avoid conflicts. (4marks)
- b) Explain FOUR Performance measures of a disk storage (6marks)
- c) Describe THREE reasons for implementing database security, hence outline THREE ways how we can implement database security in commercial databases (6marks)

QUESTION 5 [20 MARKS]

- a) During query processing, there are a number of selection operations involved.
Outline TWO Selection operations that can be used during query processing.
(4marks)
 - b) Explain THREE deadlock prevention schemes (6marks)
 - c) Explain TWO forms of replication in distributed databases (4marks)
 - d) Outline SIX data types that are usable with modern databases other than spatial databases (6 marks)
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