

CHUKA



UNIVERSITY

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**UNIVERSITY EXAMINATIONS**

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

**ACSC 352: FILE STRUCTURES AND DATABASE SYSTEMS**

**STREAMS:**

**TIME: 2 HOURS**

**DAY/DATE: TUESDAY 09/04/2019**

**11.30 A.M – 1.30 P.M**

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**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 on both sides of the question paper

**SECTION A (COMPULSORY)**

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

- a) Using a diagram, explain RAID 6 disk storage (4marks)
- b) Using an example of a schedule, explain the concept of recoverable schedule. (5marks)
- c) Explain the following hardware storage devices issues
  - i) Latent failures (2 marks)
  - ii) Data scrubbing (2 marks)
  - iii) Hot swapping (2 marks)
- d) Using an SQL extract, explain the following database operations: -
  - i) Union operations (2marks)
  - ii) Intersect operations (2marks)
  - iii) Except operations (2marks)
- e) Using an example, distinguish between failed and aborted transaction (4marks)
- f) Using a sketch diagram, explain THREE data types that are usable in spatial databases (5marks)

**SECTION B (Answer two question from this section)**

**QUESTION 2 [20 MARKS]**

- a) Assume in a certain schedule, transaction  $T_1$  transfer \$50 from account A to account B, and  $T_2$  transfer 10% of the balance from A to B. Develop a serial schedule in which  $T_1$  is followed by  $T_2$ . (4marks)
- b) Explain FOUR techniques that have been used to improve speed of access to disk storage blocks. (8marks)
- c) Distinguish between optical disk and cache storage (2marks)
- d) Using an illustration, explain the following Performance measures of a disk storage
  - i) MTTF (2marks)
  - ii) Latency time (2marks)
  - iii) Transfer rate (2marks)

**QUESTION 3 [20 MARKS]**

- a) Using a database extract. Discuss the following indexing strategies in databases: -
  - i) Dense indexing (4marks)
  - ii) Sparse indexing (4marks)
- b) Explain FOUR properties of database transactions (4marks)
- c) With regard to database security.
  - i) Explain the term database security. (2marks)
  - ii) Outline FOUR mechanisms of securing SQL databases (6marks)

**QUESTION 4 [20 MARKS]**

- a) Explain THREE types of failures that would lead to system crash (6marks)
- b) Distinguish between parallel databases and distributed databases (4marks)
- c) Explain FOUR causes of parallelism in databases (4marks)
- d) During query optimization process, there are a number of transformational relational equivalent expressions. Using sketches outline THREE of these transformational relational equivalent expressions (6marks)

**QUESTION 5 [20 MARKS]**

- a) Using an example in each case, discuss THREE deadlock prevention mechanisms (6marks)
  - b) Discuss TWO major pitfalls in designing databases during database design (4marks)
  - c) Other than spatial databases, explain the concept, advantages, disadvantages and data types of TWO modern databases. (10marks)
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