



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE
AND TECHNOLOGY**

UNIVERSITY EXAMINATION 2012/2013

**1ST YEAR 2ND SEMESTER EXAMINATION FOR THE
DEGREE OF MSC. INFORMATION SYSTEM**

KISII LEARNING CENTRE

COURSE CODE: IIS 5121

TITLE: DISTRIBUTED DATABASE SYSTEMS

DATE: 15/4/2013

TIME: 8.00-11.00AM

DURATION: 3 HOURS

INSTRUCTIONS

1. This paper contains FIVE (5) questions
2. Answer question 1 (Compulsory) and ANY other 2 Questions
3. Write all answers in the booklet provided

Question 1 – 20 Marks

- a. Explain advantages and disadvantages of Distributed Database Management Systems (6 Marks)
(1 Mark Each)
- a. Explain five fault models in databases (5 Marks)
- a. In addition to S and X lock modes, there are three additional lock modes with multiple granularities. Explain them (3 Marks)
- b. Write down a solution(s) of the following problem of timestamp-ordering protocol (3 Marks)
 - **Problem:** Suppose T_i aborts, but T_j has read a data item written by T_i
 - Then T_j must abort; if T_j had been allowed to commit earlier, the schedule is not recoverable.
 - Further, any transaction that has read a data item written by T_j must abort
 - This can lead to cascading rollback --- that is, a chain of rollbacks
- c. Discuss why correctness of Time-Stamping Ordering Protocol (4 Marks)

Question 2 – 20 Marks

- a. Let us consider the scheduling database for a company. Assume that the company has three branches in Australia: “Brisbane”, “Sydney”, and “Melbourne”, and its headquarters are located at Brisbane. We expect frequent access to the Staff, Schedule, and Client information from staffs who work at that location. We further assume that staffs at “Sydney” and “Melbourne” offices only need to access the firstName, lastName, and position attributes of Staff relation, whereas the “Brisbane” office needs regularly access to all staff, appointment, and client information. Based on this information use SQL statements to create a database that shows relationships (5 Marks)
- b. Consider three distributed transactions T1, T2, and T3, with T1 initiated at site S1 and creating a sub-transaction at S2, T2 initiated at site S2 and creating a sub-transaction at S3, and T3 initiated at site S3 and creating a sub-transaction at S1. Draw a table to show the lock operations at the three sites where read_lock(T_i, x_j) denotes a read lock by transaction T_i on item x_j , and write_lock(T_i, x_j) denotes a write lock by transaction T_i on item x_j (5 Marks)
- c. Explain four Advantages of Fragmentation (4 Marks)

- d. The definition and allocation of fragments in a DDBMS's are carried out strategically to achieve specific design goals. Discuss these goals (5 Marks)
- e. Explain advantages and disadvantages of Distributed Database Management Systems (6 Marks)

Question 3 – 20 Marks

- a. Using SQL Statement that enables a person to view a names and phone numbers (only) of those employees in their own department (4 Marks)
- b. Describe how a database management can remove privileges granted to a user in a database (3 Marks)
- c. Given the following information show lost update problem in a transaction; Transaction A: Add 1 to field F of record R; Transaction B: Double the value of field F of R; Initial value: R.F=2 (3 Marks)
- d. A transaction management subsystem of a DBMS normally consists of three properties. Explain each one of them (6 Marks)
- e. Describe Transaction giving a suitable example (3 Marks)

Question 4 – 20 Marks

- a. Explain two modes in which data items can be locked (4 Marks) (2 Marks each)
- b. Describe the following terms used in DDBMS (4 Marks)
 - i. Availability
 - ii. Reliability
- c. Explain how a database administrator can restrict someone's access to a table (3 Marks)
- d. For a view to be updatable, the defining query of the view should satisfy certain conditions. Explain these conditions (4 Marks)

Question 5 – 20 Marks

- a. Discuss how locks are implemented (5 Marks)
- b. Discuss importance of a two-phase locking protocol (1 Marks)
- c. Explain two phases of a two-phase locking protocols (4 Marks) (2 Marks each)
- d. Write an example of a transaction performing locking and describe that transaction (3 Marks)
- e. Discuss Lock Compatibility Matrix (8 Marks) (2 Marks each)