

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Final Exam, Spring-2022

Course Code: **CSE 4845**

Course Title: **Distributed Database**

Time: 2 hours 30 minutes

Full Marks: 50

- (i) The figures in the right-hand margin indicate full marks
 (ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A

[Answer the questions from the followings]

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|----|----|---|-----|-----|---|
| 1. | a) | Discuss about the Normalization of Query Decomposition. What do you know about the Query Optimization? | CO1 | R | 5 |
| 1. | b) | Write down the steps of process that transforms a high-level query (of relational calculus/SQL) into an equivalent and more efficient lower-level query (of relational algebra). | CO2 | U | 5 |
| 2. | a) | Indicate whether the following schedules can produce anomalies; the symbols c_i and a_i indicate the result (commit or abort) of the transaction:
a. $r_1(x); w_1(x); r_2(x); w_2(x); r_2(y); w_2(y); a_1; c_2$
b. $r_1(x); r_2(y); w_1(x); w_2(y); a_1; c_2$
c. $r_1(x); r_2(x); r_2(y); w_2(y); r_1(z); a_1; c_2$
d. $r_1(x); r_2(x); r_3(x); w_2(x); w_1(x); c_1; c_2; a_3$
e. $r_1(x); w_1(x); r_2(x); w_2(x); w_3(x);; c_1; c_2; c_3$ | CO4 | App | 5 |
| 2. | b) | Write down the processing issues of Transactions. What do you know about the Formalization of Transactions? | CO2 | E | 5 |

OR

- | | | | | | |
|----|----|--|-----|-----|---|
| 2. | a) | Consider the following 2 (two) Transactions, where initially $x=50$:- | CO4 | App | 5 |
|----|----|--|-----|-----|---|

T1: r(x) $x=x+1$ w(x) Commit	T2: r(x) $x=x+1$ w(x) Commit
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Given the following execution sequences:-

Sequence 1: $r_1(x), w_1(x), c_1, r_2(x), w_2(x), c_2$

Sequence 2: $r_1(x), r_2(x), w_1(x), w_2(x), c_1, c_2$

What will be the result for the Serial Execution (Sequence 1) and the Concurrent Execution (Sequence 2)? Explain the result.

2. b) Briefly describe the properties of transactions. CO2 E 5

Part B

[Answer the questions from the followings]

3. a) Write down the algorithms of 2PL (two phase locking) protocol. What do you know about the Strict-2PL? CO5 C 5
3. b) Classify the following schedule as Non-VSR, VSR or CSR:- CO2 E 5
- i. r1(x); r2(y); w3(y); r5(x); w5(u); w3(s); w2(u); w3(x); w1(u); r4(y); w5(z); r5(z)
- ii. r2(u); w2(s); r1(x); r2(y); w3(y); r5(x); w5(u); w3(s); w2(u); w3(x); w1(u); r4(y); w5(z); r5(z)
- iii. r1(x); r2(y); w3(y); r5(x); w5(u); w3(s); w2(u); w3(x); w1(u); r4(y); w5(z); r5(z); r2(u); w2(s)
4. a) What is Reliability and In-place Update? What do you know about the Commit Protocols? CO5 App 5
4. b) What is concurrency control? What do you know about the locking based concurrency algorithms? CO2 U 5
5. a) What is the concept of conceptual design and the logical design? What is the difference between star schema and snow flake schema design? CO3 An 5
- b) Discuss about the architecture of the local recovery management system. CO3 An 5

OR

5. Let us consider the case of a real estate agency whose database is composed by the following tables:- CO3 An 10
- OWNER (IDOwner, Name, Surname, Address, City, Phone)
 - ESTATE (IDestate, IDOwner, Category, Area, City, Province, Rooms, Bedrooms, Garage, Meters)
 - CUSTOMER (IDCust, Name, Surname, Budget, Address, City, Phone)
 - AGENT (IDAgent, Name, Surname, Office, Address, City, Phone)
 - AGENDA (IDAgent, Data, Hour, IDestate, ClientName)
 - VISIT (IDestate, IDAgent, IDCust, Date, Duration)
 - SALE (IDestate, IDAgent, IDCust, Date, AgreedPrice, Status)
 - RENT (IDestate, IDAgent, IDCust, Date, Price, Status, Time)

Goal:

Provide a supervisor with an overview of the situation. The supervisor must have a global view of the business, in terms of the estates the agency deals with and of the agents' work.

Questions:

- i. Design a conceptual schema for the Data Warehouse (DW)
- ii. What facts and dimensions do you consider?
- iii. Design a Star Schema or Snowflake Schema for the DW.