GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2022-2023

ADVANCED DISTRIBUTED DATA BASE MANAGEMENT SYSTEM

PGCSE104

TIME ALLOTTED: 3 HOURS **FULL MARKS: 70**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable

GROUP – A

(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **10×1=10**

		Marks	CO No.
1. (i)	In the relational modes, cardinality is termed as a) Number of tuples b) Number of attributes c) Number of tables d) Number of constraints	1	CO4
(ii)	Cartesian Product in relational algebra is a) Unary operator b) Binary operator c) Ternary operator d) Not defined	1	CO4
(iii)	Which of the following statements is true? a) If $X \twoheadrightarrow Y$, then $\not X \twoheadrightarrow Y$ b) If $X \twoheadrightarrow Y$, then $\not X \twoheadrightarrow Y$ c) If $X \twoheadrightarrow Y$, then $X \subset Y$ d) If $X \not\twoheadrightarrow Y$, then $Y \twoheadrightarrow X$	1	CO3
(iv)	Which of the following statements is true? a) An equi-join is a theta join b) A natural join is a equi-join c) A natural join is a theta join d) All of the above	1	CO4
(v)	A characteristic of an entity. a) Relation b) Attribute c) Parameter d) Constraint	1	CO2
(vi)	A transaction processor is responsible for a) Receiving and processing only local applications' data requests b) Receiving and processing only remote applications' data request c) Receiving and processing both local and remote applications' data request d) None of the above	1	CO4

(vii) In case of entity integrity, the primary key may be — 1 — CO2
a) Null
b) Not Null
c) both Null & not Null
d) Any Value

(viii) If X --> YZ then X --> Y and X --> Z is — 1 — CO3
a) Composition Rule
b) Reflexivity Rule
c) Union Rule
d) Decomposition Rule

(ix) A table on the many side of a one to many or many to many relationship must: — 1 — CO3
a) Be in Second Normal Form (2NF)
b) Be in Third Normal Form (3NF)
c) Have a single attribute key
d) Have a composite key

(x) Using relational algebra the query that finds customers, who have a balance of over 1000 is — 1 — CO4
a) $\pi_{Customer\_name}(\sigma_{balance > 1000 (Deposit)})$
b) $\pi_{Customer\_name}(\sigma_{balance >= 1000 (Deposit)})$
c) $\pi_{Customer\_name}(\sigma_{balance > 1000 (Borrow)})$
d) $\sigma_{Customer\_name}(\pi_{balance > 1000 (Borrow)})$

(xi) When the transaction finishes the final statement the transaction enters into — 1 — CO4
a) Active state
b) Committed state
c) Partially committed state
d) Abort state

(xii) Which of the following are introduced to reduce the overheads caused by the log-based recovery? — 1 — CO4
a) Checkpoints
b) Indices
c) Deadlocks
d) Locks

GROUP – B
(Short Answer Type Questions)

(Answer any *three* of the following) **3 x 5 = 15**

		Marks	CO No.
2.	Explain outer join.	5	CO4
3. a)	Discuss the properties of decomposition including attribute preservation, dependency preservation and loss less join with example.	3	CO3
b)	Explain lossy decomposition with example.	2	CO3
4.	Explain the Basic operations in Relational Algebra with the help of examples.	5	CO4
5.	What are the different types of 2PL?	5	CO4
6.	Explain deadlock in DDBMS with a 'wait for graph'.	5	CO1

GROUP – C
(Long Answer Type Questions)
(Answer any *three* of the following) **3 x 15 = 45**

		Marks	CO No.
7. a)	What is DDBMS? Write three advantages and three disadvantages of it.	5	CO2
b)	Explain Fragmentation in DDBMS.	5	CO2
c)	Write down the strategies of Semi Join in DDBMS.	5	CO2
8. a)	Let T1, T2 and T3 be transactions that operate on the same data items *A, B* and *C*. Let r1(A) mean that T1 reads A w1(A) means that T1 writes A and so on for T2 and T3. Consider the following schedule: S1: r2(c), r2(B), w2(b), r3(B), r3(C), r1(A), w1(A), w3(B), w3(C), r2(A), r1(B), w1(B), w2(A) Is the schedule serializable? Explain the reason.	5	CO4
b)	What is the difference between complete serializability and view serializability properties?	5	CO4
c)	Consider the following two transactions: *T*1 : Read (A); Read (B); If A = 0 then B : = B + 1; Write (B); *T*2 : Read (B); Read (A); If B=0 then A : = A + 1; Write (A); Add lock and unlock instructions to transactions *T*1 and *T*2, so they observe the two-phase locking protocol. Can the execution of these transactions result in a deadlock?	5	CO4
9. a)	Why BCNF is stricter than 3NF? Explain with example.	5	CO2
b)	Consider the relation assignment {worker_id, building_id, startdate, name skilltype} and FDs are {worker_id->name, (worker_id, building_id)->startdate}. Is the relation in 2NF? If not, then make it in 2NF.	5	CO2
c)	What are Armstrong axioms? Why they are called sound and complete?	5	CO2
10. a)	Explain fourth normal form with suitable example.	5	CO3
b)	What is the procedure to check 4NF.	5	CO3
c)	Cosedier the following dataset of Student (Name, Computer, Language) with the following record.	5	CO3

Name	Computer	Language
Aman	*Windows/Apple*	*English/Hindi*
Mohan	*Linux*	*English/Spanish*

Normalize the table. Is the table is in 4NF? If no, decompose it into 4NF.

11.	Short Note: (Any three)	3x5=15	
a)	Parallelism	5	CO1
b)	Majority Locking	5	CO5
c)	Distributed Time Stamping.	5	CO1
d)	3-Phase Commit.	5	CO5
e)	Transaction Coordinator.	5	CO1