

# GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2020-2021

## DATABASE MANAGEMENT SYSTEM

CS(EE)705D

TIME ALLOTTED: 3 HRS

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:  $10 \times 1 = 10$

	Marks	CO No
1.(i) In the relational modes, cardinality is termed as	1	CO2
a) Number of tuples		
b) Number of attributes		
c) Number of tables		
d) Number of constraints		
(ii) Cartesian Product in relational algebra is	1	CO1
a) Unary operator		
b) Binary operator		
c) Ternary operator		
d) Not defined		
(iii) Which of the following statements is true?	1	CO2
a) If $X \twoheadrightarrow Y$ , then $X \rightarrow Y$		
b) If $X \twoheadrightarrow Y$ , then $X \not\rightarrow Y$		
c) If $X \twoheadrightarrow Y$ , then $X \subset Y$		
d) If $X \twoheadrightarrow Y$ , then $Y \twoheadrightarrow X$		
(iv) Which of the following statements is true?	1	CO3
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		
(v) a) A characteristic of an entity.	1	CO1
a) Relation		
b) Attribute		
c) Parameter		
d) Constraint		
(vi) A transaction processor is responsible for	1	CO4
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
- (vii) In case of entity integrity, the primary key may be 1 CO1
- a) Null
- b) Not Null
- c) both Null & not Null
- d) Any Value
- (viii) If  $X \twoheadrightarrow YZ$  then  $X \twoheadrightarrow Y$  and  $X \twoheadrightarrow Z$  is 1 CO2
- 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 CO2
- 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 CO3
- a)  $\pi_{Customer\_name}(\sigma_{balance > 1000} (Deposit) )$
- b)  $\pi_{Customer\_name}(\sigma_{balance \geq 1000} (Deposit) )$
- 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**

	<b>Marks</b>	<b>CO No</b>
2. a) What is a join?	1	CO2
b) Discuss different types of joins.	4	CO2
3.a) Discuss the properties of decomposition including attribute preservation, dependency preservation and loss less join with example.	3	CO2
b) Explain lossy decomposition with example	2	CO2
4. a) What is Concurrency?	2	CO1
b) What are the advantages of Concurrency Control?	3	CO2
5.a) What is locking?	1	CO4
b) What is 2 phase locking protocol?	2	CO4
c) What is deadlock in transaction?	2	CO4
6. a) Explain Aggregation in E-R diagram.	2	CO1
b) What is logical data independence?	1	CO5
c) What is unary relationship? Give example.	2	CO3

**GROUP – C**

**(Long Answer Type Questions)**

(Answer any *three* of the following)

**3 x 15 = 45**

	<b>Marks</b>	<b>CO No</b>
7.a) Draw the E - R diagram of the following: A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily form the same ward.	9	CO1
b) What do you mean by “Ternary relationship”?	2	CO1
c) Distinguish between weak entity and strong entity with example.	3	CO1
d) What is foreign key?	1	CO1
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	6	CO4

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.

- |  |  |   |     |
|--|--|---|-----|
| b)                                       | What is cascading rollback? Give example.  | 2 | CO4 |
| c)                                       | What is the difference between serial schedule and serializable schedule?  | 2 | CO4 |
| Consider the following two transactions: |  |   |     |
| d)                                       | Consider the following two transactions:<br>T1 : Read (A); Read (B);<br>If A = 0 then B := B + 1; Write (B);<br>T2 : Read (B); Read (A);<br>If B=0 then A := A + 1; Write (A);<br>Add lock and unlock instructions to transactions T1 and T2, so they observe the two-phase locking protocol.<br>Can the execution of these transactions result in a deadlock?   | 5 | CO4 |
| 9.a)                                     | Write SQL statements on the following tables:<br>SALESPEOPLE (snum, sname, city, commission)<br>CUSTOMERS (cnum, cname, city, rating, snum)<br>ORDERS (onum, amt, odate, cnum, snum)<br>i) Find the cities of all the customers where sales-person's name is 'Riyam'.<br>ii) Find out order number and order date of those customers whose city is Kolkata and order amount is greater than 10,000.<br>iii) Show the commissions of all the sale persons who receive order of amount greater than 5,000. | 6 | CO1 |
| b)                                       | Define normalization. Enlist its type.   | 4 | CO4 |
| c)                                       | "Every relation in BCNF is also in 3NF; however, a relation in 3NF is not necessarily in BCNF" -Explain  | 5 | CO3 |
| 10.a)                                    | What are Armstrong axioms? Why they are called sound and complete?   | 5 | CO2 |
| b)                                       | Consider R={A,B,C,D,E} and the functional dependencies are like<br>F={A → BC, CD → E, B → D, E → A}<br>Find out the candidate keys.  | 3 | CO2 |
| c)                                       | What is multivalued dependency?  | 3 | CO2 |
| d)                                       | Explain fourth normal form with suitable example.  | 4 | CO2 |

11.	Short Note: (Any three)	3x5=15	
a)	Database Users	5	CO2
b)	Anomalies in Database	5	CO1
c)	Query optimization.	5	CO2
d)	Clustering	5	CO5
e)	Multilevel Indexing	5	CO1