

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2025
B. Tech. (CSE), Semester III, 2025-26

Roll No.....

CS1133: Database Management Systems

Time: 2 hours

Max. Marks: 30

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Mention all the assumptions for your answers clearly.

Q.1	Consider the following relations, with keys underlined, that keep track of airline flight information (a) Flights(<u>flno</u>, aid, from_city, to_city, distance, depart_date, arrival_date, price) (b) Aircraft(<u>aid</u>, aname) (c) Certified (<u>eid</u>,<u>aid</u>) (d) Pilots(<u>eid</u>, ename, salary) Write SQL statements to answer the following queries a) Find the names of aircraft where all pilots earn more than 80,000. b) Update the price and distance of all flights from Jaipur and Delhi that departs on 24/12/2025 to Rs. 5000 and 220 km respectively c) Find the total number of flights flown per city d) Drop the table Certified. What should be the sequence of operations that must be performed for dropping the relation 'Certified'.	(2+1+1+2) (CO4)
Q.2.1	a. Consider the attribute set R(X, Y, Z, W, V). Find the minimal /canonical cover for the following set $F = \{ X \rightarrow YZ, Y \rightarrow Z, XZ \rightarrow W, W \rightarrow V, V \rightarrow X \}$ b. Consider the following relation R(A, B, C,D,E) with FDs as {A->B, A->C, D->E}. This relation is decomposed into R1 (A,B,C) and R2 (A,D,E). Is the decomposition lossless? Show why or why not. c. What are the Armstrong's Axioms. Express them in terms of functional dependencies.	2 1 2 (CO3)

Q.2.2	Consider a Relation R (A, B, C, D), and the set of FDs F: {A→B, BC→D, A→C} Answer the following: - Identify the candidate keys - Identify the best normal form it satisfies. Show the steps for each normal form. If it is not in BCNF, decompose it into a set of BCNF relations.	2+3=5 (CO3)
Q.3	Consider the following schedule. There are three resources X, Y and Z and three transactions T1,T2 and T3. T1: Lock shared (X) T2: Lock shared (Z) T3: Lock shared (X) T1: Lock shared (Z) T2: Lock exclusive (X) T3: Lock shared (Y) T1: Lock exclusive (Y) - Draw the precedence graph with an explanation for each edge. - Is the schedule serializable? If so, what is the equivalent serial schedule? OR - What are the rules for a precedence graph to check serializability? - What is 2PL. Draw the compatibility matrix to show conflicting and non-conflicting locks.	2+2 (CO5) 2+2 (CO5)
Q.4	Consider the following schedule with three transactions T1, T2, T3 and three resources A, B and C. Assume T1 started at time 2 pm, T2 started at 3 pm and T3 started at 4 pm. Read₂(C) Read₁(A) Write₃(C) Read₃(A) Write₂(B) Write₁(B) Read₂(B) Using time-stamp ordering scheme for concurrency control find if the schedule is serializable? OR	4 (CO5)

	a. In time stamp-based concurrency protocol, what are the rules when a transaction T wants to READ and WRITE a resource A? b. What does ACID stand for. Explain the purpose and importance of each term clearly	2+2 (CO5)
Q.5	Given the following log file in the format (read/write, Transaction, resource, before image, after image). There are three transactions and two resources. <pre> (start, T1); (write, T1, B, 5, 7); (start, T2); (write, T2, C, 1, 9); (commit, T1); (start, T3); (write, T3, B, 7, 2); (commit T3) -----System crash----- </pre> a. Apply the UNDO/REDO algorithm. a. What action will apply to each of the transactions? b. What will be the final value of B and C? b. Apply the UNDO/NO-REDO algorithm. Assume only Before images are stored. a. What action will apply to each of the three transactions? c. Apply the NO-UNDO/REDO algorithm. Assume only After images are stored. a. What action will apply to each of the three transactions? OR a. Consider the schedule in Q3. Is there a deadlock situation? b. Given the following schedule: R1(X), R3(X), W1(X), W2(X), R3(X). Show the existence of Unrepeatable Read. Give an example of Lost Update Problem	2 1 1 (CO6) 2+2 (CO5)
Q.6	Write the Relational Algebra equivalent of the following SQL: <pre> SELECT C.NAME FROM CUSTOMER C INNER JOIN ACCOUNT A ON C. CUST_ID = A. CUST_ID WHERE C.CITY ='JAIPUR' </pre>	2 (CO3,4)

