

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY
 End Term Examination, December 2023
 BCA, Semester I, 2023-24

Roll No.....

CS1417: Database Management and Applications

Time: 2.0 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	Every airplane has a registration number, and each airplane is of a specific model. The airport accommodates a number of airplane models, and each model is identified by a model number (e.g., Boeing 747) and has a capacity and a weight. A number of technicians work at the airport. You need to store the name, SSN, address, phone number, and salary of each technician. Each technician is an expert on one or more plane model(s), and his or her expertise may overlap with that of other technicians. This information about technicians must also be recorded. Traffic controllers must have an annual medical examination. For each traffic controller, you must store the date of the most recent exam. All airport employees (including technicians) belong to a union. You must store the union membership number of each employee. You can assume that each employee is uniquely identified by the social security number. Draw the ER diagram for the database. Clearly mark the cardinality, participation, primary key, type of attribute	5.0 (LO 2)
Q.2	Consider the following relations, with keys underlined, that keep track of airline flight information Flights(<u>flno</u>, aid, from_city, to_city, distance, depart_date, arrival_date, price) Aircraft(<u>aid</u>, aname) Certified (<u>eid</u>, <u>aid</u>) Pilots(<u>eid</u>, ename, salary) Using the schema provided above, write Relational Algebra for the following: a. Find the names of aircraft where all pilots certified to operate them earn more than 80,000. b. Find all pilots who are not certified. c. Find the aircrafts that have never flown between Delhi to Chennai d. Find the pilots who have flown every/all aircrafts e. Find the pilots who have the same certificate as Ravi	5.0 (LO 4)

Q.3	For the airline flight information schema provided above, write the following queries using SQL: - Create the table <i>certified</i> with the appropriate primary and foreign key constraints - Find the cheapest flight between Delhi and Jaipur - Find all the pilots who have flown from Jaipur atleast twice. Display the details of the pilots. - Give a 10 percent rise in salary to all pilots who are certified. - Delete all pilots who are not certified - Alter the table <i>aircraft</i> to include a not null column called model. - Remove the relation Pilot from the database	7.0 (LO 3)
Q.4.1	Consider a Relation R (A, B, C, D), and the set of FDs $AB \rightarrow C, AB \rightarrow D, C \rightarrow A, D \rightarrow B$ 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. - Is the decomposition lossless and dependency preserving?	1+2+ 1+1=5.0 (LO 5)
Q.4.2	Given a relation R(A,B,C,D,E) and F = (A → BC, CD → E, B → D, E → A). Can the following FDs be derived from? Prove your solution. - A → E - B → E	2.0 (LO 5)
Q. 5	Answer the following questions: - For the following relation definition identify the candidate key, Super Key, Primary key CAR {License_number, Engine_serial_no, model, year} - Consider a Product P1 stored across 3 files in a file system. The same product P1 is also stored in a Database. Which is better, storing P1 in a file system or a database. Justify your answer in detail. - Represent a Customer, c1, as structured Data and as semi-structured data.	2+2+ 2=6.0 (LO1,2)