

**Thapar Institute of Engineering and Technology, Patiala**  
Department of Computer Science and Engineering  
**AUXILIARY EXAMINATION**

Course Code: UCT 402	Course Name: Database Management Systems
August 22, 2024	Thursday, 5.30 PM – 8.30 PM
Time: 3 hours, M. Marks: 100	Name of Faculty: Dr. Rupali Bhardwaj

**Note:** Attempt all the questions.

Q1 a.	Draw the overall structure of DBMS and explain its various components.	07
Q1 b.	What are the differences between the terms: Candidate key, Primary Key, Super key, Composite key and Alternate key? Explain with example.	07
Q2 a.	Construct an E-R diagram for an institute having entities student, teacher, classroom and department. Assume suitable attributes of entities and relations among them.	07
Q2 b.	Compare Generalization, Specialization with suitable example.	07
Q2 c.	List ACID properties of transaction. Explain the usefulness of each.	07
Q3 a.	Consider relation scheme, $R = \{faculty, dean, department, chairperson, professor, rank, student\}$ with the set of functional dependencies- $faculty \rightarrow dean$ $professor \rightarrow rank, chairperson$ $student \rightarrow department, faculty, dean$ $department \rightarrow faculty, chairperson$ $dean \rightarrow faculty$ $professor, rank \rightarrow department, faculty$ i. Determine key for the relation. ii. Normalize the relation up to 3NF normal form and justify your answer. iii. Determine whether the decomposition in 3NF is lossy or lossless. iv. Determine the dependencies in 3NF are preserved or not.	01+07+07+07
Q3 b.	What is functional dependency? Explain trivial and non-trivial functional dependency with example. Compute canonical cover for relation $R = (A, B, C)$ with following FDs- $F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$	07
Q4 a.	Consider the following schema for institute library: .	5*3=15

	<p>Student (RollNo, Name, Father_ Name, Branch)</p> <p>Book (ISBN, Title, Author, Publisher)</p> <p>Issue (RollNo, ISBN, Date-of -Issue)</p> <p>Write the following queries in SQL :</p> <p>i. List roll number and name of all students of the branch 'CSE'.</p> <p>ii. Find the name of student who has issued a book published by 'ABC' publisher.</p> <p>iii. List title of all books and their authors issued to a student 'RAM'.</p> <p>iv. List title of all books issued on or before December 1, 2020.</p> <p>v. List all books published by publisher 'ABC'.</p>	
Q5b.	Describe serializable schedule. Discuss conflict serializability with suitable example.	07
Q6a.	Given a schedule S for transactions T1 and T2 with set of read and write operations, S: R1(X) R2(X) R2(Y) W2(Y) R1(Y) W1(X). Identify, whether given schedule is equivalent to serial schedule or not?	07
Q6b.	Discuss two phase commit (2PC) protocol and time stamp based protocol with suitable example. How the validation based protocols differ from 2PC?	07