

Guru Nanak Dev Engineering College, Ludhiana

Department of Information Technology

Program	B.Tech.	Semester	6
Subject Code	PCIT-104	Subject Title	Database Management System
(MST) No.	1	Course Coordinator	Mohanjit Kaur Kang
Max. Marks	24	Time Duration	1hr 30 mins
Date of MST		Roll Number	

Note: Attempt all questions

Q. No.	Question	COs, RBT level	Marks
Q1	Define database management system and mention its applications.	CO1, L1	2
Q2	Analyze primary, candidate and super key with example.	CO1, L4	2
Q3	Discuss schemas with difference between external, logical and physical level schemas. Also explain architecture of dbms.	CO1, L2,L3	4
Q4	Discuss CODD rule for DBMS.	CO1, L3	4
Q5	What do you mean by Entity Relationship diagram and why it is useful? Draw E-R diagram for hospital with the set of patient and medical doctors.	CO2, L4	4
Q6	Describe Relational Algebra. Consider the relational database: Student (person_name, street, city) Works (person_name, college name, fees) College (college_name, city) Teachers(person_name, teacher name) a) Find the names of the students and college name for all students. b) Find the names of students who are from Ludhiana and whose fees is more than 5000 c) Give the info for teachers who belong to city Ludhiana. d) Give the info for students who do not belong to Ludhiana.	CO2, L4	8

Course Outcomes (CO)

Students will be able to

1	Apply knowledge of database system, No Sql database, data mining and SQL structure.
2	Identify, formulate database design, Functional dependencies and recovery techniques
3	Use the techniques, skills and tools such as query handling, normalized relations
4	Design Physical and object relational database.
5	Investigate various case studies using NoSql.
6	Apply the Applications of spatial and multimedia databases for real world.

RBT Classification	Lower Order Thinking Levels (LOTS)			Higher Order Thinking Levels (HOTS)		
RBT Level Number	L1	L2	L3	L4	L5	L6
RBT Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Create

9

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

MORNING

[Total No. of Questions: 09]

04 OCT 2023

[Total No. of Pages: 2]

Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 4th

Name of Subject: Database Management System

Subject Code: PCIT-104

Paper ID: 16233

Scientific calculator is NotAllowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) Differentiate between Inner join and Outer join.
- b) How Data Marts are used for creating Data Warehouse?
- c) Write a syntax for outer join with example.
- d) Explain the different applications of Data Mining.
- e) Describe the role of shadow paging in recovery systems.
- f) Write a syntax of insert and update command in SQL.

Part – B

[Marks: 04 each]

- Q2. Write a short note on applications of spatial and multimedia databases.
- Q3. Explain the ACID properties in the context of transaction management
- Q4. Discuss the concept of functional dependencies and their role in database design.
- Q5. Analyze various recovery techniques used in database management system.
- Q6. Distinguish between Data Definition Language (DDL) and Data Manipulation Language (DML) in the context of database management. Include practical examples to illustrate how each language is used.
- Q7. Design a set of database tables that exemplify the principles of Boyce-Codd Normal Form (BCNF), and Fourth Normal Form (4NF) in the context of a DBMS. Provide a

practical example to illustrate the application of these normalization forms in database design

Part – C

[Marks: 12 each]

- Q8.** What is Database Recovery? Explain the different types of database failure and types of recovery techniques with advantages and disadvantages.

OR

Examine and contrast various data models utilized within Database Management Systems for effective database design.

- Q9.** Examine the phenomenon of deadlock in multi-process or multi-threaded systems, delving into the underlying causes and ramifications. Subsequently, present a comprehensive and step-by-step elucidation of the deadlock detection and resolution process, accompanied by a significant real-world example that highlights the practical application of these concepts.

OR

Consider a database for an online bookstore that includes tables for books, authors, and customers. Write SQL commands to perform the following tasks:

1. Create a table named "Books" with columns for book ID, title, author ID, price, and quantity in stock.
 2. Insert a new book into the "Books" table. The book is titled "The Great Gatsby" by F. Scott Fitzgerald, with a price of \$12.99 and 50 copies in stock.
 3. Create a table named "Authors" with columns for author ID, name, and biography.
 4. Insert a new author into the "Authors" table. The author is F. Scott Fitzgerald, and his biography should be provided.
 5. Create a table named "Customers" with columns for customer ID, name, email, and address.
 6. Insert a new customer into the "Customers" table. Include their name, email address, and physical address.
 7. Write a SQL query to retrieve the titles & prices of all books in the "Books" table.
- Please provide the SQL commands for each of the above tasks, along with a brief explanation of what each command does.

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

Uni. Roll No.

[Total No. of Pages: 02]

MORNING

20 SEP 2022

Program: B.Tech. (Batch 2018 onward)

Semester: 4th

Name of Subject: Database Management System

Subject Code: PCIT-104

Paper ID: 16233

Scientific calculator is Not Allowed

Detail of allowed codes/charts/tables etc. Nil

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

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Part – A

[Marks: 02 each]

Q1.

- a) Write the merits of database compared to a file system.
- b) What is data dictionary used for?
- c) How many timestamps are associated in validation based protocols?
- d) What are the fields used in log based recovery?
- e) List the four types of NoSQL Database.
- f) Distinguish between database and data marts.

Part – B

[Marks: 04 each]

Q2. Define foreign key? How does it play a role in the join operation?

Q3. Give example of following relationships : a. Many-to-One b. One-to-One c. One-to-Many d. Many-to-Many

Q4. What is significance of atomicity and consistency? Give an example of each.

- Q5.** Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one1 to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. Calculate the minimum number of tables required to represent this situation in the relational model?
- Q6.** Suppose that there is a database system that never fails. Analyze whether a recovery manager required for this system
- Q7.** Elaborate in detail the various steps of data mining.

Part – C**[Marks: 12 each]**

- Q8.** Differentiate between 1NF and 2NF. Design any 1NF table and convert it into 2NF specifying the required rules

OR

Create a table called "Class" that contains six columns: classID, Branch LastName, FirstName, Address, and City. Perform a not null on the class table and also create primary key on the same table.

- Q9.** Consider the following tables: Employee (Emp_no, Name, Emp_city) Company (Emp_no, Company_name, Salary)

- Write a SQL query to display Employee name and company name.
- ii. Write a SQL query to display employee name, employee city ,company name and salary of all the employees whose salary >10000
- iii. Write a query to display all the employees working in 'XYZ' company.

OR

Why Google and Face book Switched to NoSQL? Discuss as a Case Study.

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

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Uni. Roll No.

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Program: B.Tech. (Batch 2018 onward)
Semester: 4th
Name of Subject: Database Management System
Subject Code: PCIT-104
Paper ID: 16233

EVENING

25 JUN 2022

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) Describe the types of keys used in SQL database.
- b) Define different types of Relational Calculus.
- c) How Data Marts are used for creating Data Warehouse?
- d) Differentiate between Inner join and Outer join.
- e) Where NoSQL database is preferable over a relational database?
- f) Write a syntax of table creation and insertion command in SQL.

Part – B

[Marks: 04 each]

- Q2. What is Data Warehousing? Explain the advantages of Data Warehousing.
- Q3. Write a short note on applications of spatial and multimedia databases.
- Q4. Elaborate the significance of ACID properties of database management system with the help of some examples.
- Q5. Define the term NoSQL with example? Analyze why NoSQL database is used by facebook and google applications.
- Q6. Design an ER diagram for student enrollment system. Take student, teacher and subjects as entities.

- Q7. Consider the insurance database as mentioned below, where the primary keys are underlined. Construct the following SQL queries for this relational database.

Note: The participated relation relates drivers, cars, and accidents.

person (driver id, name, address)

car (license, model, year)

accident (report number, date, location)

owns (driver id, license)

participated (driver id, license, report number, damage amount)

- Find the total number of people who owned cars that were involved in accidents in 2009.
- Add a new accident to the database; assume any values for required attributes.
- Delete the Mazda (car model) belonging to "John Smith" (person name).

Part – C

[Marks: 12 each]

- Q8. Define normalization. Why we need to normalize a database in SQL? Briefly discuss the insert, delete and update anomalies, if relations are not in 2NF.

OR

Compare different types of data models used in database management systems.

- Q9. Analyze various recovery techniques used in database management system. How to implement these techniques in SQL Databases?

OR

- a) Suppose that we have a relation marks(ID, score) and we wish to assign grades to students based on the score as follows: grade F if score < 40, grade C if $40 \leq \text{score} < 60$, grade B if $60 \leq \text{score} < 80$, and grade A if $80 \leq \text{score}$. Write SQL queries to do the following:

- Display the grade for each student, based on the marks relation. (3 marks)
- Find the number of students with each grade. (3 marks)

- b) Design a database Schema for "E-Commerce website" using SQL queries and ER diagram. (6 marks)

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

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[Total No. of Questions: 09]

Uni. Roll No.

10 JAN 2023

[Total No. of Pages: 2]

Program: B.Tech. (Batch 2018 onward)

Semester: 4

Name of Subject: Database Management System

Subject Code: PCIT-104

Paper ID:16233

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory**
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice**
- 3) Any missing data may be assumed appropriately**

Part – A

[Marks: 02 each]

Q1.

- a) Elaborate the concept of Logical database Design.
- b) Write a short note on data marts?
- c) Explain the use of triggers in database management systems.
- d) Why functional dependencies are significant in DBMS?
- e) Differentiate between super key and primary key.
- f) Write a query to get the highest, lowest, sum, and average salary of all employees from “employee” table having EMPLOYEE_ID, SALARY, FIRST_NAME columns.

Part – B

[Marks: 04 each]

- Q2. Discuss first three forms of Normalization using relevant examples.**
- Q3. Elaborate the significance of ACID properties of database management system with the help of some real examples.**
- Q4. Define Data Mining. Explain different applications of Data Mining.**
- Q5. Design a database of any case study using NoSQL database terms and terminology.**
- Q6. Design an ER diagram for Library management system. Take “Books”, “Publisher”, “Member” and “borrowed by” as entities.**

EVENING
10 JAN 2023

- Q7. Why do deadlock occurs? Create the complete process of deadlock detection and resolution with significant example.

Part - C

[Marks: 12 each]

- Q8. Compare different types of data models used in database management systems.

OR

What is Database Recovery? Explain the different types of database failure and types of recovery techniques with advantages and disadvantages.

- Q9. Design a database tables to demonstrate the 1NF, 2NF, 3NF and BCNF in DBMS with detailed example.

OR

Design the SQL queries for the following: (3 marks each)

1. Create a table and Insert 3 rows.
2. Create two tables and Select the data from both the tables using joins.
3. Add and drop a primary key, foreign and unique key constraints
4. Update and delete the data from table using where constraints

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[Total No. of Questions: 09]
Uni. Roll No.

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12 JUN 2023

[Total No. of Pages: 2]

Program: B.Tech. (Batch 2018 onward)
Semester: 4th

Name of Subject: Database Management System
Subject Code: PCIT-104
Paper ID: 16233
Scientific calculator is Not Allowed

Time Allowed: 03 Hours

NOTE:

Max. Marks: 60

- 1) Parts A and B are compulsory
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- 3) Any missing data may be assumed appropriately

Part – A

Q1.

[Marks: 02 each]

- a) How does a trigger work in a database system?
- b) Describe the role of shadow paging in recovery systems.
- c) Explain the different applications of Data Mining.
- d) Differentiate between primary key and super key.
- e) Why concurrency control is important in database systems?
- f) Write a syntax for Inner join with example.

Part – B

[Marks: 04 each]

- Q2.** Discuss the concept of functional dependencies and their role in database design.
- Q3.** Explain the structures of relational databases, including tables, rows, and columns.
- Q4.** Classify different types of failures that can occur in a database system. Discuss the role of recovery and atomicity in ensuring data consistency.
- Q5.** Compare and contrast data definition language (DDL) and data manipulation language (DML), and provide examples of their usage.
- Q6.** Design database tables to demonstrate the 3NF and BCNF in DBMS with example.
- Q7.** Consider a university database system that stores information about students, courses, and grades. The database has the following tables:

Students (*student_id, name, email, major, advisor_id*)

Courses (*course_id, title, department, credits*)

Enrollments (*enrollment_id, student_id, course_id, semester, grade*)

Design the process of logical database in the context of the university database system. Discuss the importance of integrity constraints in ensuring data accuracy and consistency.

Part - C

[Marks: 12 each]

- Q8.** Explain the ACID properties in the context of transaction management. How do they ensure data consistency and reliability?

OR

Explain the concept of data warehousing and its advantages in decision support systems. Discuss the role of data marts in supporting specific business functions.

- Q9.** Design a database of any case study using NoSQL database terms and terminology. Explain in detail with comments.

OR

Consider a database schema for an online bookstore with the following tables:

Books (*book_id, title, author, price, publication_year*)

Customers (*customer_id, name, email, address*)

Orders (*order_id, customer_id, book_id, order_date, quantity*)

Write SQL queries to perform the following tasks:

1. Retrieve the titles and authors of all books published in the year 2022.
2. Retrieve the names and email addresses of customers who have placed at least one order.
3. Calculate the total price of each order by multiplying the quantity of each book by its price, and display the *order_id, customer_id*, and total price.
4. Find the customer who has placed the maximum number of orders.
