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B.Tech. (CSE) (Semester 4th)
DATABASE MANAGEMENT SYSTEMS-I
Subject Code: BCSE1412
Paper ID: [111107]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:
a) Prove that every cyclic group is abelian and discuss its significance with an example.
b) What is a Karnaugh map?
c) What is the purpose of a UNIQUE constraint in a relational database?
d) What is the purpose of a SELECT statement in SQL?
e) Give an example of a DDL command in SQL.
f) What is a functional dependency in a relational database?
g) What does the acronym ACID stand for in transaction management?
h) Explain how deadlocks are handled in a DBMS.
i) What is a B-tree? Explain how it is used in indexing.
j) What is file organization in a database system?

Section – B **(5 marks each)**

Q2. Explain the relational data model with its key components: tables, attributes, and tuples. Provide a suitable example.

Q3. What are weak entities? Explain how they are represented in an ER diagram with the help of an example.

Q4. Discuss the differences between DML, DDL, and DCL in SQL. Provide examples of commands under each category.

Q5. Explain 1NF, 2NF, and 3NF with suitable examples. Discuss the process of converting a relation from 1NF to 2NF and then to 3NF.

Q6. What are the differences between Discretionary Access Control (DAC) and Mandatory Access Control (MAC)? Discuss how each mechanism regulates access to database objects.

Section – C **(10 marks each)**

Q7. Explain the relational model in detail, including its key components (tables, attributes, tuples, domains). Discuss how an ER model is converted into a relational schema with an example.

Q8. Describe the Two-Phase Locking (2PL) protocol in concurrency control. Explain how 2PL ensures serializability and discuss its advantages and limitations.

Q9. Explain the concept of a hash table in database indexing. Discuss how open addressing and separate chaining resolve hash collisions and their respective advantages and disadvantages. Compare the efficiency of these techniques in terms of search, insert, and delete operations.