

Please check that this question paper contains 09 questions and 03 printed pages within first ten minutes.

[Total No. of Questions: 09]

EVENING

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Uni. Roll No. ....

28 DEC 2022

Program: B.Tech. (Batch 2018 onwards)

Semester: 5<sup>th</sup>

Name of Subject: Database Management Systems

Subject Code: PCCS-109

Paper ID: 16429

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) Illustrate components of a DBMS
- b) Identify the differences between a sub-query and a join.
- c) Explain the Referential Integrity Constraint.
- d) Show an example of a relation schema R and a set of dependencies such that R is in BCNF, but is not in 4NF.
- e) Elaborate the structure of a B-Tree in Database Management System.
- f) Compare and Contrast the differences between Discretionary and Mandatory access control.

Part – B

[Marks: 04 each]

Q2. What do you mean by External Schema, Conceptual Schema and Internal Schema?  
Explain with the help of a diagram.

Q3. Consider the Relational Database:

employee (Person\_name, Street, City), works (Person\_name, Company\_name, Salary),  
company (Company\_name, city), Manages(Person\_name, manager\_name). Give an  
expression in the relational algebra to express each of the following queries:

- a) Find the names of all the employees who live in the same city and on the same street as do their managers.
- b) Find the names of all the employees in this database who donot work for First Bank Co-operation.
- c) Find the names of all the employees who earn more than every employee of small bank co-operation.
- Q4. Define Boyce-Codd Normal Form. How does it differ with 3<sup>rd</sup> Normal Form?
- Q5. Classify the types of serializability of a schedule with an example.
- Q6. Discuss the recovery techniques using deferred database modification.
- Q7. List the aggregate functions used in SQL with suitable query examples.

## Part – C

[Marks: 12 each]

- Q8. Consider a university database for the scheduling of classrooms for final exams. This database could be modelled as the single entity set exam, with attributes course\_name, section\_number, room\_number and time. Alternatively, one or more additional entity sets could be defined along with relationship sets to replace some of the attributes of the exam entity set as:
- Course with attributes name, department and c-number.
  - Section with attributes s-number and enrolment also dependent as a weak entity set on course.
  - Room with attributes r-number, capacity and building.
- a) Show an E-R diagram illustrating the use of all three additional entity sets listed.
- b) Explain what application characteristics would influence a decision to include or not to include each of the additional entity sets.

OR

Consider the following relational database:

Employee(employee\_name, street, city), Works(employee\_name, company\_name, salary),  
Company(company\_name, city), manages(employee\_name, manager\_name). Given an  
SQL DDL definition of this database. Identify referential integrity constraints that should  
hold and include them in the DDL definition.

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Q9 Evaluate the need of recovery management in DBMS. Identify the types of security approaches that can be applied by an organisation to secure any DBMS which are accessible over the web.

OR

Propose a detailed solution for the following protocols:

- a) Two-phase locking.
- b) Timestamp ordering.
- c) Validation
- d) Two-phase locking with multiple granularity locking.

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