Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50009

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Third/Fourth Semester

Artificial Intelligence and Data Science

AD 3391 — DATABASE DESIGN AND MANAGEMENT

(Common to Computer Science and Engineering (Artificial Intelligence and Machine Learning))

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List any two advantages of database systems.

2. State the different types of integrity constraints used in designing a relational database.

3. Define trivial functional dependency.

4. An object is created without any reference to it, how can that object be deleted?

5. Write an efficient relational algebraic expression for the following query:

   SELECT B1.BANKNAME FROM BANK AS B1, B2 WHERE B1.ASSETS> B2.ASSETS AND B2.BANKLOCATION="TAMILNADU".

6. List the steps involved in query processing.

7. Define the term transaction. Give an example.

8. State the benefits of strict two-phase locking.

9. Distinguish total rollback from partial rollback.

10. State denormalization.

PART B — (5 × 13 = 65 marks)

11. (a) Classify Database system architecture and explain.

Or

(b) Construct an ER-diagram for hospital management system with a set of patients and a set of doctors. Associate with each patient a log of the various tests and examination conducted.

(i) Draw the ER-diagram for Hospital Database. (7)

(ii) For each entity set and relationship used, indicate primary key, 1-1, many to one and one to many relationships. (6)

12. (a) Distinguish between procedural and non-procedural languages. Is relational algebra procedural or non-procedural. Explain the operations with example.

Or

(b) Consider the following relational database :

Employee (person_name, street, city)

Works (person_name, company_name, salary)

Company (company_name, city)

Manager (person_name, manager_name)

Give an SQL DDL, definition of this database. Identify referential integrity constraints that should hold, and include them in DDL definition.

13. (a) Consider the relation $R(A,B,C,D,E)$ with functional dependencies

$\{a \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$

Identify super keys. Find F*.

Or

(b) Discuss the procedure used for loss-less decomposition with an example.

14. (a) Distinguish recoverable and non-recoverable schedules. Why is recoverability of schedules desirable? Are there any circumstances under which it would be desirable to allow non-recoverable schedules? Justify your answer.

Or

(b) What is the need for concurrency control mechanisms? Explain the working of lock-based protocols.

15. (a) Describe the features of object-oriented data model.

Or

(b) Explain the HBase data model with an example.

PART C — (1 × 15 = 15 marks)

16. (a) Describe normalization upto 3NF and BCNF with examples. State the desirable properties of decomposition.

Or

(b) Discuss query optimization with a diagram.

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