UG Even Semester (CBCS) Exam., May—2017

COMPUTER SCIENCE

(4th Semester)

Course No. : MCSCC–403

(Database Management Sytems)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Discuss the main characteristic of the database approach. How does it differ from traditional file systems? 7

(b) Discuss the capabilities that should be provided by DBMS. 7

2. *(a)* Describe the three-schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture? 7

(b) Define the following terms : 7

(i) Data model

(ii) Database schema

(iii) Database state

UNIT—II

3. *(a)* What is an entity type? What is an entity set? Explain the differences among an entity, an entity type and an entity set. 7

(b) Discuss the role of a high-level data model in the database design process. 7

4. *(a)* Discuss the various reasons that lead to the occurrence of null values in relations. 7

(b) Discuss the entity integrity and referential integrity constraints. Why is each considered important? 7

UNIT—III

5. *(a)* What is union compatibility? Why do the UNION, INTERSECTION and SET DIFFERENCE operations require that the relations on which they are applied be union compatible? 7

(b) List the operation of relational algebra and the purpose of each. 7

6. (a) Show how you may specify the following relational algebraic operations in tuple relational calculus : 7

(i) $_{A \quad C}(R(A, B, C))$

(ii) $_{A,\ B}\ (R(A, B, C))$

(iii) $R(A, B, C) \quad S(C, D, E)$

(b) Given two relations $R1$ and $R2$ where $R1$ contains $N1$ tuples, $R2$ contains $N2$ tuples and $N2 \quad N1 \quad 0$. For what relational operations given below the minimum and maximum sizes are 0 and $N1$ respectively? 7

(i) $R1 \quad R2$

(ii) $_{A \quad 5}(R1)$

(iii) Both (i) and (ii)

(iv) $_{A}(R1)$

Unit—IV

7. (a) Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples. 7

(b) What is a functional dependency? Why are the possible sources of the information that defines the functional dependencies that hold among the attributes of a relation schema? 7

8. (a) Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF? 7

(b) What is lossless join property of a decomposition? Why is it important? 7

Unit—V

9. (a) What is the two-phase locking protocol? How does it guarantee serializability? 7

(b) Discuss the atomicity, durability, isolation and consistency preservation properties of a database transaction. 7

10. (a) What is timestamp? How does the system generate timestamps? 7

(b) How can recovery handle transaction operations that do not affect the database, such as printing of reports by a transaction? 7

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