

SEMESTER EXAMINATION-2021
Class – MCA I SEM SUBJECT:COMPUTER SCIENCE
PAPER CODE: MCA-C105
PAPER TITLE: DATABASE MANAGEMENT SYSTEM

Time: 3 hour

Max. Marks: 70

Min. Pass: 40%

Note: Question Paper is divided into two sections: **A and B**. Attempt both the sections as per given instructions.

SECTION-A (SHORT ANSWER TYPE QUESTIONS)

Instructions: Answer any five questions in about 150 words each. Each question carries six marks. (5 X 6 = 30 Marks)

Question-1: Define the terms: primary key, candidate key, and super key.

Question-2: Explain set operations in relational algebra.

Question-3: Explain the distinction between total and partial constraints.

Question-4: What are the three data anomalies that are likely to occur as a result of data redundancy? Can data redundancy be completely eliminated in database approach?

Question-5: What is a weak entity set?

Question-6: Explain ACID properties. Explain the usefulness of each.

Question-7: What undesirable dependencies are avoided when a relation is in 3NF?

Question-8: Define different type of outer joins.

Question-9: What is log? How it is maintained?

Question-10: Define Dynamic hashing techniques.

SECTION-B (LONG ANSWER TYPE QUESTIONS)

Instructions: Answer any FOUR questions in detail. Each question carries 10 marks. (4 X 10 = 40 Marks)

Question-11: Let the following relation schemas be given:

$R = (A, B, C)$ $S = (D, E, F)$

Let relations $r(R)$ and $s(S)$ be given. Give an expression in SQL that is equivalent to each of the following queries.

a. $\Pi_A(r)$

- b. $\sigma_{B=17}(r)$
- c. $r \times s$
- d. $\Pi_{A,F}(\sigma_{C=D}(r \times s))$

Question-12: What are schedules? What are differences between conflict serializability and view serializability?

Question-13: List the definitions of first, second and third normal forms with suitable examples.

Question-14: Which of the following schedules is conflict serializable? for each serializable schedule, determine the equivalent serial schedule:

- a. $r1(x); r3(x); w3(x); w1(x); r2(x)$
- b. $r3(x); r2(x); w3(x); r1(x); w1(x)$
- c. $r3(x); r3(x); r1(x); w3(x); w1(x)$

Question-15: What is lossless decomposition? Suppose that we decompose the schema $R = (A, B, C, D, E)$ into (A, B, C) and (A, D, E) Show that this decomposition is a lossless-join decomposition if the following set F of functional dependencies holds: $(A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A)$.

Question-16: Define functional dependency. List all functional dependencies satisfied by the relation of Figure

A	B	C
a1	b1	c1
a2	b1	c1
a1	b1	c2
a2	b1	c3

Question-17: A company database needs to store information about employees (SSN, Salary, Phone, Address, Name), departments (DNO, DName, Budget, Dmgrssn) and children of employees (Name, Age). Employee work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company. Draw an Entity - Relationship diagram that captures this information using the concepts and notations of ER.

Question-18: Explain B+tree index files with example. What is the Difference between B Tree and B+ Tree Index Files?

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