Roll No. | | | | | | | | | | |

## B.E (FT) END SEMESTER EXAMINATIONS – JAN / APR 2025

Computer Science and Engineering
Semester
**CS6106 – Data Base Management Systems**
(Regulation 2018 - RUSA)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

**PART-A (10 x 2 = 20 Marks)**

1. Give the significant differences between a file system and a DBMS.
2. List the basic components of Entity Relationship Diagram.
3. Give the significance of integrity constraints.
4. Find the minimal cover of the set of functional dependencies given;
   $\{A \rightarrow C, AB \rightarrow C, C \rightarrow DI, CD \rightarrow I, EC \rightarrow AB, EI \rightarrow C\}$
5. What is static SQL and how does it differ from dynamic SQL
6. Summarize the significance of ACID properties in transaction management
7. State the need for concurrency
8. What do you mean by pipelining?
9. Compare and contrast Indexing and hashing.
10. What is Database Tuning?

**PART – B ( 8 x 8 = 64 marks)**
**(Answer any 8 questions)**

11. Explain the database system architecture with a neat diagram.
12. Discuss the design issues while converting ERD into Relational schema.
13. Consider the following relational schema and write SQL queries for the following:

    Employees (Employee_ID, Employee_Name, Department_ID)
    Departments (Department_ID, Department_Name)
    Purchases (Purchase_ID, Employee_ID, Purchase_Amount, Purchase_Date)
    Salaries (Employee_ID, Salary)

    (i) Retrieve the Department_Name, Employee_Name, and Salary of employees from departments whose total salary cost exceeds $500,000.(2)

    (ii) Retrieve the Employee_Name, Department_Name, and Salary for employees who work in departments with more than 100 employees and earn more than the average salary for that department. (3)

    (iii) Retrieve the Employee_Name, Department_Name, total Purchase_Amount, and Purchase_Count of employees who have made purchases exceeding $1,000 and whose total purchase value is higher than the average purchase value for their department.(3)

14. Compute the closure of the following set F of functional dependencies for relation schema R = (A, B, C, D, E). A → BC, CD → E, B → D, E → A List the candidate keys for R.

15. Write a trigger on the employee table which shows the old values and new values of Ename after any updations on ename on Employee table. Show the corresponding table before and after.

16. Illustrate the locking protocols for concurrency control.

17. Define Deadlock and explain about deadlock recovery and deadlock prevention.

18. Explain the steps involved in query processing with an example.

19. What is Query optimization? What are the parameters used for cost estimation while processing a query?

20. State the limitations of static hashing. How dynamic hashing overcomes those limitations?

21. Discuss in detail about Spatial and Temporal Database and its applications.

22. Explain architecture of data warehouse and discuss the various components of data warehouse.

## PART – C ( 2 x 8 = 16marks)

23. Consider the following schedule S involving four transactions T1, T2, T3, and T4 operating on data items A and B:

r1(A); r2(B); w1(B); r3(A); w3(B); w2(A); r4(B); w4(A)

i) Construct the precedence (serializability) graph for the given schedule, clearly indicating all edges and their direction based on conflicting operations.

ii) Determine whether the schedule S is conflict serializable. If so, provide all possible serial orders of transactions that are conflict-equivalent to S.

iii) If the schedule is not conflict serializable, identify the cycle(s) in the precedence graph and explain which conflicting operations cause the cycle(s).

iv) Discuss whether the given schedule is recoverable. Justify your answer based on the order of read and write operations and the possibility of dirty reads.

24. (i) 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 → BC, CD → E , B → D, E → A (5)

(ii) Show that the above decomposition is not a dependency-preserving decomposition.