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I Semester M.C.A. Degree Examination, April/May - 2026

COMPUTER SCIENCE

Advanced Database Management Systems

(CBCS Scheme 2025)

Paper : MCA104T

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates:

- 1) Part- A: Answer any Five questions. Each question carries 6 marks.
- 2) Part- B: Answer any Four questions. Each question carries 10 marks.

PART - A

(5×6=30)

1. Describe the three levels of abstraction in DBMS architecture.
2. Design an ER diagram for a library system identifying the entities (minimum 3), attributes, keys and the cardinality.
3. Explain multivalued dependencies and 4NF with an example.
4. Explain deadlock handling techniques.
5. Compare heuristic vs cost-based optimization.
6. Design a University data warehouse using star schema. Identify the fact & dimension tables for department-wise statistical analysis.
7. Explain MongoDB data model and CRUD operations.
8. Explain the MapReduce workflow with a neat diagram.

PART - B

(4×10=40)

9. a) Given the following Relations, formulate the following SQL queries. (6)
Order(Order_no, order_date, cust_id, order_status) [order status can be 'P' or 'C' for Pending and Complete respectively]
Order_dtl(Order_no, item_cd, qty_ordered)
Item(item_cd, item_description, item_rate)
 - i) Count the number of orders that are pending.
 - ii) Find customer-wise number of orders placed.
 - iii) List the items which have not been ordered at all.
- b) Differentiate between Relational Algebra and Relational Calculus. (4)

[P.T.O.]



10. a) Normalize the following relation up to 3NF: (6)
Order (OrderID, CustomerName, CustomerAddress, ProductID, ProductName, Quantity, SupplierName, SupplierAddress)
- b) Explain the ARIES recovery algorithm. (4)
11. a) Consider a relation: (6)
R(A, B, C, D, E, F)
with the following set of functional dependencies:
 $A \rightarrow BC$
 $B \rightarrow D$
 $CD \rightarrow E$
 $E \rightarrow F$
- i) Compute the closure of A (A).
ii) Find all the candidate keys of the relation R.
- b) What is checkpoint in recovery? (4)
12. a) Explain the different Transaction States with a neat diagram. (4)
b) Discuss OLAP operations with appropriate examples. (6)
13. a) Discuss database security mechanisms discretionary access control, mandatory access control, and role-based security. (6)
b) Explain the CAP theorem. (4)
14. Write short notes on any Two; Each one carries 5 marks:
- a) SPARK SQL
b) Cloud databases
c) XML databases
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