

MCA (Revised)
Term-End Examination
December, 2007

**MCS-023 : DATABASE MANAGEMENT
SYSTEMS**

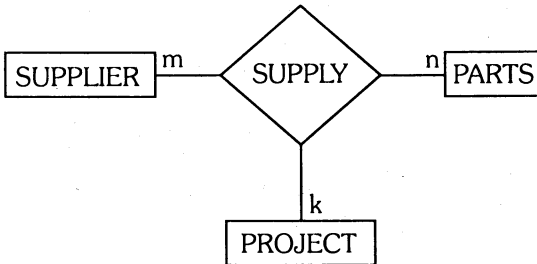
Time : 3 hours

Maximum Marks : 100
(Weightage 75%)

Note : Question number 1 is **compulsory**. Attempt any **three** questions from the rest.

1. (a) What is the mathematical basis of SQL ? The SQL statement `SELECT * FROM STUDENT;` will serve the purpose of selection (σ) operation or projection (π) operation ? Give details in support of your answer. 1+1+3=5
- (b) Prove the statement "Any relation which is in BCNF is in 3NF but the converse is not true". 5
- (c) Is there any relationship between the concept of data security and data integrity ? If yes, briefly describe the relationship with the help of a diagram. 5

- (d) Create the tables from the following ER diagrams : 5



- (e) Consider the following database schema :

EMPLOYEE (ESSN, ENAME, DOB, DEPT_NO,
SALARY)

DEPENDENT (ESSN, DEPEND_NAME,
RELATION, DOB)

DEPARTMENT (DEPT_NO, DEPT_NAME,
MANAGER)

Perform following Queries using relational algebra and SQL both :

5×2=10

- (i) Find details of dependents for employee having name AJAY.
- (ii) Find the name of the manager of the department in which employee with ESSN Code 5078 works.
- (iii) Find the name of all employees whose age is less than 18 years.
- (iv) Find the DOB of the son of an employee having employee code ESSN 5078.
- (v) Find the details of the departments in which the employee having employee code ESSN 5078 has worked.

(f) What do you mean by the term View in databases ?
 What are the advantages of Views ? Can we perform
 a delete, modify or insert operation if the View
 contains Group function ? 2+2+1=5

(g) Briefly describe the concept of optimistic scheduling
 as a policy to handle a concurrent environment. 5

2. (a) What are the advantages of having three level
 database architecture ? How are they related to the
 concept of data independence ? 5

(b) What do you mean by the term “database
 recovery” ? Explain any two recovery techniques. 5

(c) Consider the relations R_1 and R_2 , and use them to
 perform the operations given below : 5×2=10

$R_1 :=$	A	B	$R_2 :=$	A	B
	A_1	B_1		A_1	B_1
	A_2	B_2		A_7	B_7
	A_3	B_3		A_2	B_2
	A_4	B_4		A_4	B_4

(i) $R_1 \cup R_2$

(ii) $R_1 \cap R_2$

(iii) $R_1 - R_2 \neq R_2 - R_1$

(iv) $R_1 \times R_2$

(v) $R_1 - (R_2 - R_3) \neq (R_1 - R_2) - R_3$

3. (a) Describe the benefit of data replication in DDBMS. What typical units of data are replicated in the process of data replication ? $2\frac{1}{2}+2\frac{1}{2}=5$
- (b) Consider the relation $R = \{A, B, C, D, E, F, G, H\}$. Let the functional dependency set of relation R be given by $FD = \{A \rightarrow C; B \rightarrow CG; AD \rightarrow EH; C \rightarrow DF; A \rightarrow H\}$. On the basis of given details, perform following tasks : $4+6=10$
- (i) Determine the key for relation R .
- (ii) Decompose R into 2NF, 3NF and finally in BCNF.
- (c) What is a system log ? What are the typical kinds of entries in a system log ? $2\frac{1}{2}+2\frac{1}{2}=5$
4. (a) What are checkpoints ? Briefly discuss their importance. $2\frac{1}{2}+2\frac{1}{2}=5$
- (b) Compare primary, secondary and clustering indexes. Which of these indexes are dense and which are not ? How is implementation of clustering indexes performed ? $6+2+2=10$
- (c) What do you mean by the terms "Loss-Less Decomposition" and "Dependency Preserving Decomposition" ? Briefly describe the importance of Dependency Preservation. 5

5. Write short notes on the following :

4×5=20

- (i) States of transaction execution
- (ii) Set operators in relational algebra
- (iii) Advantages and Disadvantages of DDBMS
- (iv) Integrity Constraints

