

**MCA (Revised)**  
**Term-End Examination**  
**December, 2007**

**MCS-023 : DATABASE MANAGEMENT  
SYSTEMS**

Time : 3 hours

Maximum Marks : 100  
(Weightage 75%)

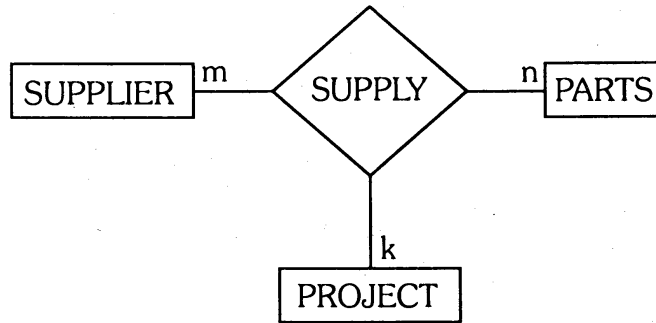
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**Note :** Question number 1 is **compulsory**. Attempt any **three** questions from the rest.

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1. (a) What is the mathematical basis of SQL ? The SQL statement `SELECT * FROM STUDENT;` will serve the purpose of selection ( $\sigma$ ) operation or projection ( $\pi$ ) 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 :  $4 \times 5 = 20$

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