DATABASE MANAGEMENT SYSTEM – II (SEMESTER - 4)

CS/MCA/SEM-4/MCA-403/09

1. ....
     Signature of Invigilator

2. ....   ***Reg. No.***
     Signature of the Officer-in-Charge

Roll No. of the Candidate

CS/MCA/SEM-4/MCA-403/09
ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
DATABASE MANAGEMENT SYSTEM – II (SEMESTER - 4)

Time : 3 Hours]   [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.

2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question.**

    b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.

3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.

4. Read the instructions given inside carefully before answering.

5. You should not forget to write the corresponding question numbers while answering.

6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.

7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**

8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.

9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided
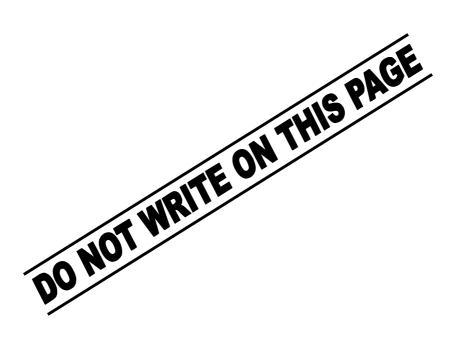
FOR OFFICE USE / EVALUATION ONLY
Marks Obtained

	Group – A								Group – B		Group – C			Total Marks	Examiner's Signature
Question Number															
Marks Obtained															

....
Head-Examiner/Co-Ordinator/Scrutineer

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GROUP – A

(Multiple Choice Type Questions)

1.　Choose the correct alternatives for the following : 　　　　　　10 × 1 = 10

　　i)　Normalization follows

　　　　a)　top down approach　　　　b)　bottom up approach

　　　　c)　both of (a) and (b)　　　　d)　none of these.

　　ii)　Suppose R is a relation of n attributes { A1, A2, ... An } as a function of n. How many super keys R has if the only key is A1 ?

　　　　a)　$2 * n$　　　　　　　　　b)　$2 * (n - 1)$

　　　　c)　2^{n-1}　　　　　　　　d)　none of these.

　　iii)　F covers E implies

　　　　a)　every FD in E also in F+　　b)　every FD of F also in E+

　　　　c)　both (a) & (b)　　　　　　d)　none of these.

　　iv)　To test equality with the NULL, operator .... is used.

　　　　a)　=　　　　　　　　　　　b)　==

　　　　c)　IS NULL　　　　　　　　d)　none of these.

　　v)　Explicit cursor

　　　　a)　is a temporary named memory location

　　　　b)　consists of active data set

　　　　c)　could process one record at a time

　　　　d)　all of these.

vi) Cascading rollback is occurred due to deviation from the property

    a) atomicity   b) consistency

    c) isolation   d) durability.

vii) A query with multiple selection conditions that are connected via OR may not be prompting the query optimizer to use any index. Such a query can be split up and expressed as .... of queries, each with a condition on an attribute that causes an index to be used.

    a) intersection   b) union

    c) division   d) minus.

viii) Which of the following ensures the atomicity of the transactions ?

    a) Transaction management component

    b) Application programmer

    c) Concurrency control component

    d) Recovery management component.

ix) Which of the following is a schedule that brings the database back to a consistent state ?

    a) recoverable schedule   b) non-cascading schedule

    c) strict schedule   d) all of these.

x) Which of the following is not a recovery technique ?

    a) Deferred update   b) Immediate update

    c) Shadow paging   d) Write-ahead logging.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following questions.   3 × 5 = 15

2. "Every relational schema having two attributes is in BCNF." Prove this statement.

Define candidate key.   4 + 1

3. What is multi-valued dependency ? What type of constraints does it specify ? When does it arise ?

4. Consider the following relation :

   CUSTOMER (<u>Cust id</u>, name, address, city, state, pin).

   The relation is decomposed into the following relations :

   R1 (<u>Cust id</u>, name, address, pin) and **R2 (city, state, <u>pin</u>)**.

   Examine whether the decomposition leads to DKNF or not.

5. Draw three tier architecture of relational database management system. Explain data independence with the help of this diagram.

6. Consider the following relation algebra :

   π customer-name (σ branch-city = "kolkata" ∧ balance > 1000 (Branch ⋈ (Account ⋈ Deposit))

   Draw Expression Tree of the above relational algebra and optimize the expression tree.

7. Discuss the advantages of distributed and centralized databases.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following questions.   3 × 15 = 45

8. a) Consider the following set F of functional dependencies for relation schema $R = (A, B, C, D, E)$ and $F = \{ A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A \}$.

   i) Compute F^+. (closure of F)

   ii) Compute B^+. (closure of attribute B)

   iii) List the candidate keys for R.   5 + 3 + 2

   b) Describe with example different types of anomalies.   5

9.   a)   Show by example that there are schedules possible under Tree protocol which are not possible under Two-phase protocol and vice versa.   6

      b)   For the relation $R = (A, B, C, D)$ and FD $F = \{A \rightarrow B, A \rightarrow C, C \rightarrow D\}$, R is decomposed into $R1 = (A, B, C, P)$ and $R2 = (C, D)$. Is the above decomposition lossless join decomposition ? Does this decomposition preserve the dependency ?   3 + 3

      c)   State the principle of Wound-Wait technique.   3

10.   a)   Discuss primary index, cluster index, secondary index and multilevel index structures with the help of diagram for each.   8

      b)   Specify steps of query execution.   3

      c)   Differentiate between cost based query optimization and heuristic based query optimization.   2

      d)   Differentiate between 3NF and BCNF.   2

11.   a)   Test the serializability for the following schedule with explanation :   6

T1	T2	T3	T4	T5
Read (y)	Read (x)			
Read (z)				
				Read (v)
				Read (w)
				Write (w)
	Read (y)			
	Write (y)			
		Write (z)		
Read (u)				
			Read (y)	
			Write (y)	
			Read (z)	
			Write (z)	
Read (u)				
Write (u)				

b) State the three rules for concurrency control. 3

c) Define DKNF.

Consider the relation **STUDENT (SID, Grade Level, Building, Fee)**. Constraint is SID key; SID must not begin with digit 1. Domain definitions are as follows :

SID in DDDD, D is decimal digit

Grade level in { FR, SO, JR, SN, GR }

Building in Char (4)

Fee in DEC (4)

Normalize the above relation to DKNF with explanation. 2 + 4

12. a) Explain the concept of distributed database. What are the advantages and functions of distributed database ? 8

b) What is Phantom problem ? Give an example. 2

c) Identify the basic features of an object oriented data model. 5

END