

Name :

Roll No. :

Invigilator's Signature :

CS / B.TECH (CSE) / SEM-5 / CS-502 / 2010-11

2010-11

DATABASE MANAGEMENT SYSTEMS

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$
 - i) Relation is considered to be n sound normal form if it is in first normal form and it has no dependencies.
 - a) referential
 - b) functional
 - c) partial key
 - d) transitive.
 - ii) Four DML commands are
 - a) Create, Update, Delete, Select
 - b) Insert, Update, Drop, Select
 - c) Create, Alter, Delete, Select
 - d) Insert, Modify, Delete, Select.

$$\{ \text{BankID}, \text{AccountNum} \rightarrow \text{Balance}, \text{BankID}, \text{AccountNum} \rightarrow \text{Customer}, \text{Customer} \rightarrow \text{BankID} \}$$

a) First b) Second

c) Third d) Boyce Codde.

- a) Complex data types
- b) Multi valued attributes
- c) Associations with multiplicities
- d) Generalization relationships.

a) Meta data b) Tera data

c) Hyper data d) none of these.

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- vi) The ability to modify the internal schema without causing any change to external schema is
- a) Physical data independence
 - b) Logical data independence
 - c) External data independence
 - d) none of these.
- vii) One of the shortcomings of file system is
- a) data availability
 - b) fixed records
 - c) sequential records
 - d) lack of security.
- viii) Which of the following levels of obstruction involves the view of data ?
- a) External level
 - b) Conceptual level
 - c) Physical level
 - d) None of these.
- ix) A normal form in which every determinant is a key, is
- a) 2NF
 - b) 3NF
 - c) BCNF
 - d) 4NF.
- x) Overall logical structure of a database can be graphically expressed by
- a) ER-diagram
 - b) Records
 - c) Relation
 - d) Hierarchy.

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GROUP - B**(Short Answer Type Questions)**Answer any *three* of the following. $3 \times 5 = 15$

2. Describe Three-Schema Architecture of DBMS. Define Physical Data Independence and Logical Data Independence.

 $3 + 2$

3. What is a View ?

View does not take any memory space.- Justify.

4. Find out closure of attribute set (AG) i.e. $(AG)^+$ in the relational schema R and set of functional dependencies F as given below :

$$R = (A, B, C, G, H, I)$$

$$F = \{ A \rightarrow B$$

$$A \rightarrow C$$

$$CG \rightarrow H$$

$$CG \rightarrow I$$

$$B \rightarrow H \}$$

Is (AG) a super key of R ?

5. Explain wait-die and wound-wait protocols for deadlock prevention. $2 \times 2\frac{1}{2}$

6. Indicate the difference between conflict equivalence and view equivalence.

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GROUP - C**(Long Answer Type Questions)**Answer any *three* of the following. $3 \times 15 = 45$

7. a) Explain the terms 'Fully Functional Dependency' and 'Multivalued Dependency' with example. Differentiate BCNF and 3NF. What is lossless decomposition ?
- b) Consider the following relation REFRIG (Model #, Year, Price, Manuf_plant, Color) and with the following dependencies :

$$F = \{ M \rightarrow MP, \{M, Y\} \rightarrow P, MP \rightarrow C \}$$

- i) Evaluate each of the following as a candidate key for REFRIG, giving reasons why it can or cannot be a key : $\{ M \}$, $\{M, Y\}$, $\{ M, C \}$
- ii) Based on the above key determination state whether this relation is in BCNF or in 3NF, giving proper reasons.
- iii) Consider the decomposition $D = \{ R1 (M, Y, P), R2 (M, MP, C) \}$. Is this decomposition lossless ? Show why ? $(4 + 3 + 2) + (3 \times 2)$

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8. a) Draw an ER diagram for a travel agency consisting of following :
Customers, buses, drivers, conductors, guides, tickets, booking, agents, reservations, conducted tours and hotels.
- b) Describe entities, attributes, relationships and primary keys.
- c) Reduce the ER diagram into relational schema by defining all the constraints and assumptions.
- 6 + 4 + 5
9. a) Discuss the 'insertion anomalies', 'update anomalies' and 'deletion anomalies' with respect to normal forms with suitable example and suggest a method to overcome them.
- b) Why a relation that is in 3NF generally considered good although BCNF is stronger than 3NF?
- c) Explain the terms 'Fully Functional Dependency' and 'Multivalued Dependency' with example. 6 + 5 + 4
10. a) Consider insertion sequence :
8, 5, 1, 7, 3, 12, 9, 6, 20, 13. Construct B+ Tree.
- b) Consider the file with $r = 30000$ records (fixed-length) of size $R = 100$ bytes stored on a disk with block size $B = 1024$ bytes. Suppose each index entry in index file takes 15 (9 bytes for index value, 5 bytes for pointer) bytes. What is the number of accessing blocks for clustering index?

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- c) What is partitioned hashing ? How does it work ?
What are the limitations ? 5 + 7 + 3

11. a) Draw the precedence graph for the following schedule. Test the schedule whether it is conflict or serial schedule. If conflict then write down the equivalent serial schedule :

T ₁	T ₂	T ₃
R (x) W (x)		R (y) R (z)
	R (z)	W (y) W (y)
R (y) W (y)	R (y) W (y) R (x) W (x)	

- b) What is 'Phantom Phenomenon' ?
- c) What benefit does strict two-phase locking provide ?
What disadvantages result ? (5 + 3) + 3 + 4

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