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.

iii) Given the relation schema Bank (BankID, AccountNumb, Balance, Customer) with FDs :

{ BankID, AccountNumb → Balance, BankID, AccountNumb → Customer, Customer → BankID }

What is the highest normal form for the relation schema Bank ?

a) First b) Second

c) Third d) Boyce Codde.

iv) Which of the following feature is supported in the relation database model ?

a) Complex data types

b) Multi valued attributes

c) Associations with multiplicities

d) Generalization relationships.

v) The information about data in a database is called

a) Meta data b) Tera data

c) Hyper data d) none of these.

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.

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.

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 × 2)

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', 'updation 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 3 NF ?

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 ?

c) What is partitioned hashing ? How does it work ? What are the limitations ? 5 + 7 + 8

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
		$R(y)$
		$R(z)$
$R(x)$		
$W(x)$		
		$W(y)$
		$W(y)$
	$R(z)$	
$R(y)$		
$W(y)$		
	$R(y)$	
	$W(y)$	
	$R(x)$	
	$W(x)$	

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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