Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (ECE) (Separate Supple)/SEM-7/EC-704C/2011

2011
DATABASE MANAGEMENT SYSTEM

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 any *ten* of the following : $10 \times 1 = 10$

i) Overall logical structure of a database can be expressed graphically by _____

a) ER diagram b) Records

c) Relations d) Hierarchy

ii) A normal form in which every determinant is a key

a) 2NF b) 3NF

c) BCNF d) 4NF

iii) Which of the following levels of abstraction involves the views of data ?

a) External level b) Conceptual level

c) Physical level d) None of these.

iv) One of the causes of the failure of file system

a) Data availability b) Fixed records

c) Sequential records d) Lack of security

v) The following is a most restricted view of database

a) internal level b) external level

c) conceptual level d) physical level

vi) The ability to modify the internal schema without causing any change to the external schema

a) Physical data independence

b) Logical Data independence

c) External Data independence

d) None of these.

vii) The information about data in a database is called ____

a) Meta data b) Tera data

c) hyper data d) None of these.

viii) Which of the following features is supported in the relational database model ?

a) Complex data types

b) Multi-valued attributes

c) Associations with multiplicities

d) Generalization relationships.

ix) Four DML commands

a) CREATE, UPDATE, DELETE, SELECT

b) INSERT, UPDATE, DROP, SELECT

c) CREATE, ALTER, DELETE, SELECT

d) INSERT, MODIFY, DELETE, SELECT

e) INSERT, UPDATE, DELETE, SELECT.

x) Given the relation schema Bank (Bank ID, Account Numb, Balance, Customer) with FDs :

{BankID, AccountNumb -> Balance; BankID, Account Numb- > Customer; Customer-> BankID }.

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

a) first b) second

c) third d) Boyce Codde.

xi) A relation is considered to be in second normal form if it is in first normal form and it has no _____ dependencies

a) referential b) functional

c) partial key d) transitive.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. BCNF is stronger than 3NF. Justify your answer.
3. Describe different roles of a DBA.
4. What is indexing and what are the different types of indexing ?
5. What is transaction ? Write the ACID properties of transaction.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

6. a) What are the fundamental operations in Relational Algebra ? 5

   b) Draw the ER diagram to capture the requirements stated below : 10

   A company has several business units. Each business unit has multiple projects. Employees must be assigned to one business unit. One or more employees are assigned to a project, but an employee may be on vacation and not assign to any project. One of the assigned employee will be the project manager for the project.

7. a) Consider the relation :

   – Courses (Dept#, Course#, Lecturer#, Num_Students)

   • Assumptions :

   – Each Department offers many courses

   – Course# is unique within a Department only*

   – Each Lecturer belongs to one Dept only

   – Each Lecturer may handle several courses within the dept.

   – A particular course offered by a department may be handled by a single lecturer.

   Normalize the Relation on the basis of the above Assumption. 10

   b) What is fully Functional Dependency ? Explain with a suitable example. 2 + 3

8. Define Concurrency. What are the problems of concurrency ? Define Locks and locking protocol. How would you use it to control concurrency ? 15

9. a) Create a database called COMPANY consisting of two tables- EMP & DEP

EMP

Column name, Data type, Description

EMPNO, Number, Employee number

ENAME, Varchar, Employee name

JOB, Char, Designation

MGR, Number Manager's Emp. number

HIREDATE, Date, Date of joining

SAL, Number, Basic Salary

COMM, Number, Commission

DEPTNO, Number, Department Number

DEPT

Column name, Data type, Description

DEPTNO, Number, Department number

DNAME, Varchar, Department name

LOC, Varchar, Location of department

Perform the following Query :

i) List details of employees who have joined before 30 Sep. 81.

ii) List employees not belonging to department 30, 40, or 10. 7 × 2

iii) List employees whose names either start or end with "S".

iv) List the maximum, minimum and average salary in the company.

v) List names of employees who are more than 2 years old in the company.

vi) List the department numbers and number of employees in each department.

vii) List the department number and total salary payable in each department.

b) Define View. 1

10. Consider the following six relations for an order processing database application in a company :

CUSTOMER (Cust#, Cname, City)

ORDER (Order#, Odate, Cust#, Ord_Amt)

ORDER_ITEM (Order#, Item#, Qty)

ITEM (Item#, Unit_price)

SHIPMENT (Order#, Warehouse#, Ship_date)

WAREHOUSE (Warehouse#, City)

Here, Ord_Amt refers to total dollar amount of an order; Odate is the date the order was placed; Ship_date is the date an order is shipped from the warehouse. Assume that an order can be shipped from several warehouse. Specify the

foreign keys for the above schema, stating any assumptions you make. Then specify the following queries in relational algebra :

a〉 List of Order# and Ship_date for all orders shipped from Warehouse number 'W2'.

b〉 List the Warehouse information from which the Customer named 'Shyam' was supplied his orders. Produce a listing : Order#, Warehouse#.

c〉 Produce a listing : CUSTNAME,#OFORDERS, AVG_ORDER_AMT, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.

d〉 List the orders that were not shipped within 30 days of ordering.

e〉 List of Order# for orders that were shipped from all warehouses that the company has in Bhubaneswar.

3 + 3 + 3 + 3 + 3