Mawlana Bhashani Science and Technology University
Department of Information and Communication Technology
2nd Year 2nd Semester B. Sc. (Engg.) Final Examination-2012

Course Title: Database Management System
Marks: 70

Course Code: ICT -221
Time: 3.0 hours

N.B.: (i). Answer any **FIVE** from the following questions
(ii). Figures in the right margin indicate marks
(iii). Illustrates where necessary

1. (a) What is DBMS? Explain the Goals of a DBMS 4
   (b) What do you mean by weak entity set? Explain the participation of weak entity set in relationship with examples. 4
   (c) Explain the difference between schema and instance with appropriate example. 2
   (d) Describe various type of data abstraction with figure. 4

2. (a) Consider the following relational database, where the primary keys are underlined. 10
   branch (branch_name, branch_city, assets)
   customer (customer_name, customer_street, customer_city)
   loan (loan_number, branch_name, amount)
   borrower (customer_name, loan_number)
   account (account_number, branch_name, balance)
   depositor (customer_name, account_number)

   Give an expression in the relational algebra to express each of the following queries:
   I. Find those customer names who live in "Harrison".
   II. Find all names of all bank customers who have a loan at Perryridge branch.
   III. Find the names of all branches with customers who have an account in the bank and who live in Harrison.
   IV. Find the total assets and maximum asset at each branch.
   (b) What is basic structure of relational database? Explain. 2
   (c) What is select and project operation? Explain. 2

3. (a) Consider the following relational database, where the primary keys are underlined 14

   employee (ename, street, city)
   emp_company (ename, cname, salary)
   company (cname, city)
   manager (ename, mname, shift)

   Here *ename* means employee name, *cname* means company name and *mname* means manager name
   Construct the following SQL queries for this relational database
   I. Increase the salary of employees by 10% for whose salary is greater than 20000 and 5% to all others.
   II. Find names, street addresses and cities of residence of all employees who work under manager Sabbir
   III. Find the names and salary of each employee who lives in Rangpur.
   IV. Find the names of the employees living in the same city where Rahim is residing.
   V. Find the managers name starting with 'S' and has exact 5 letter in his name.
   VI. Display the average salary of each company except Square Pharma.
   VII. Delete records form emp_company that contain employees living in Rajshahi.

4. (a) List two reasons why *null* values might be introduced into the database. 3
   (b) What do you mean by materialized view? List two major problems with processing update operations expressed in terms of views. 6
   (c) With example, explain the operations of inner and outer joins. 5

5. (a) Explain Generalization and Specialization with example. 3
   (b) Define attribute. Describe various types of attribute with example. 5
   (c) With example define and describe trigger. 4
   (d) Draw the schema diagram of banking enterprise of question 2(a). 2

6. (a) What is transaction? Explain the transaction properties that are required for the database 4
       system to ensure integrity of the data? 4
   (b) What is cascadeless schedule? What is the importance of cascadeless schedules? 6
   (c) What do you understand by conflict equivalent and view equivalent schedules? Explain
       with example.

7. (a) What is deadlock? How wait-for graph is used for deadlock detection? 4
   (b) Compare two-phase, strict two-phase and rigorous two-phase protocol. 4
   (c) What is concurrency control scheme? ✓ 2
   (d) With example show how does tree protocol work? Mention the advantages. 4

8. (a) Explain the difference between Unique key and Primary key constraints. 3
   (b) Describe 1NF, 2NF, 3NF with example 6
   (c) What is RAID? What are the types of RAID? 2
   (d) What is indexing? Describe its advantages and disadvantages. 3

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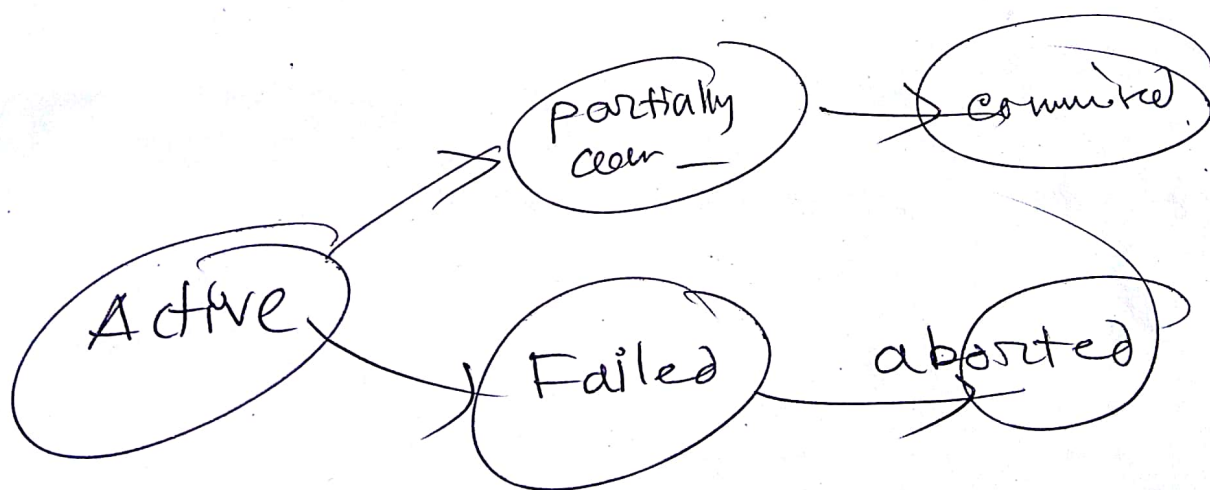
Transaction state diagram

Department of Information and communication Technology (ICT)
2nd Year 2nd Semester Final Examination-2014

Course Title: Database Management System

Course Code: ICT-221(BL)

Time: 3 Hours

Marks: 70

Answer any FIVE from the following questions

1. a) What do you mean by DBMS? Explain the Goals of a DBMS.   3
   b) What is data abstraction? Describe various type of data abstraction with figure.   4
   c) Explain the difference between schema and instance with appropriate example.   4
   d) Draw the block diagram of database system architecture.   3

2. a) Consider the following relational schema, where the primary keys are underlined.   10

   branch (branch_name, branch_city, assets)
   customer (customer_name, customer_street, customer_city)
   loan (loan_number, branch_name, amount)
   borrower (customer_name, loan_number)
   account (account_number, branch_name, balance)
   depositor (customer_name, account_number)

   Give an expression in the relational algebra to express each of the following queries:
   (i) The customer names, loan numbers, and loan amounts for all loans at the **Perryridge** branch.
   (ii) The average balance for all accounts.
   (iii) The average balance for each customer who lives in **Harrison** and has at least three accounts.
   (iv) The names of all customers whose street address includes the substring 'Main'.
   (v) The number of depositors for each branch.

   b) Explain DDL and DML.   4

3. Consider the following relational database, where the primary keys are underlined   14

   branch (branch_name, branch_city, assets)
   customer (customer_name, customer_street, customer_city)
   loan (loan_number, branch_name, amount)
   borrower (customer_name, loan_number)
   account (account_number, branch_name, balance)
   depositor = (customer_name, account_number)

   Give an expression in the relational algebra to express each of the following queries:

   i. Find the names of all bank customers who have either an account or a loan or both.
   ii. Find all customers of the bank who have an account but not a loan.
   iii. Find the names of all customers who have a loan at the bank along with the loan number and amount.
   iv. Find the names of all customers who have a loan at the bank and whose names are neither Smith nor Jones.
   v. Update the records so that accounts with balances over $10,000 will receive 6% interest, whereas all others will receive 5%.
   vi. Find the total assets and maximum asset at each branch.
   vii. Find the number of depositors for each branch.

4. a) Explain Primary key and Foreign key with examples?   3
   b) Explain Generalization and Specialization with example   4

c) Draw the E-R diagram for the following relation schemas:

Worker (*worker id*, worker_name, hourly_rate, skill_type, supervisor_id)
Assignment (*worker id, building id*, start_date, num_days)
Building (*building id*, address, building_type)

d) Explain the participation of weak entity set in relationship with examples.   4

5. a) What do you understand by conflict equivalent and view equivalent schedules?   6
Explain with example.

b) What is deadlock? How is wait-for graph used for deadlock detection?   4

c) What is cascade less schedule? What is the importance of cascade less schedules?   4

6. a) What is functional dependency (FD)? Explain Armstrong's axioms used to find   6
logically implied functional dependency.

b) What do you mean by data warehousing? Briefly explain the architecture of a typical   5
data warehouse with figure.

c) What do you mean by data mining? Write some applications of data mining.   3

7. a) Define functional dependency.   2

b) Compute the closure of the following set F of functional dependencies for relation   7
schema $R = (A, B, C, D, E)$

$A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A$

List the candidate keys for R.

c) Suppose that we decompose the schema $R = (A, B, C, D, E)$ into (A, B, C) and (C, D, E).   5
Show that this decomposition is *not* lossless-join decomposition if the following set F
of functional dependencies holds:

$A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A$

8. a) Describe slotted page structure for organizing records within a single block.   4

b) What is Data Dictionary?   2

c) Explain why Multitable Clustering File Organization is important? For the following   5
relation what will be the Multitable Clustering File Organization?

Customer_nam	Account_No
Rahim	A-120
Rahim	A-220
Rahim	A-320
Karim	A-420

Account relation

Customer_n	Street	City
Rahim	Dhanmondi	Dhaka
Karim	Station Road	Rangpur

Customer Relation

d) List two reasons why *null* values might be introduced into the database.   3

Mawlana Bhashani Science and Technology University
Department of Information and communication Technology (ICT)
2nd Year 2nd Semester B.Sc. (Engg.)Final Examination-2015

Course Title: **Relational Database Management System**
Time: **3 Hours**

Course Code: **ICT-2205**

Marks: **70**

N.B.:
i) Answer any five from the following questions
ii) The sequence should be maintained in answering each of the questions

1. a) What do you understand by data Semantics? — 2
   b) What is Database Management System? Why are the advantages of using DBMS over traditional file-processing system? — 4
   c) Write down the role of a Database Administrator. — 3
   d) What are the levels of Abstraction used in DBMS? Briefly discuss on them. — 3
   e) Draw the block diagram of database system architecture. — 2

2. a) What are the differences between schema and instance? — 3
   b) Describe the various applications of Database Management System. — 3
   c) Why view is an important aspect of DBMS? — 3
   d) What is a data model? Discuss the different types of data model. — 5

3. a) Show the Full Outer Join operations with necessary example. — 3
   b) Explain how the renaming operator is used. Is it required? — 3
   c) What are data sublanguages? Why are they important? — 3
   d) What is RAID? Briefly explain the RAID Level 1, Level 2 and Level 3. — 5

4. a) What do you mean by nested subquereies? Describe with example. — 3
   b) Define entity set and week entity set with suitable example. — 3
   c) Explain the importance and application of the WHERE clause in the UPDATE and DELETE statements. — 4
   d) What is the difference between a candidate key and the primary key for a given relation? Why foreign key constraints are so important? — 4

5. a) Describe different types of attribute that can be used in an E-R modeling DB system. Also with an example show how they can be represented in an E-R diagram. — 4
   b) What do you understand by referential integrity? Explain with example. — 3
   c) Construct an E-R model to represent the data used by the library. — 7

   The library provides books to borrowers. Each book is described by title, edition, and year of publication, and is uniquely identified using the ISBN. Each borrower is described by his or her name and address and is uniquely identified using a borrower number. The library provides one or more copies of each book and each copy is uniquely identified using a copy number, status indicating if the book is available for loan, and the allowable loan period for a given copy. A borrower may loan one or many books, and the date each book is loaned out and is returned is recorded. Loan number uniquely identifies each book loan.

6. a) Consider the following relational database, where the primary keys are underlined — 10
   person (*driver-id#*, name, address)
   car (*license*, model, year)
   accident (*report-number*, *date*, location)
   owns (*driver-id#*, *license*)
   participated (*driver-id*, *car*, *report-number*, damage-amount)
   Give an expression in the relational algebra to express each of the following queries:

i. Find the total number of people who owned cars that were involved in accidents in 1989.
ii. Find the number of accidents in which the cars belonging to "John Smith" were involved.
iii. Add a new accident to the database; assume any values for required attributes.
iv. Delete the Mazda belonging to "John Smith".
v. Update the damage amount for the car with license number "AABB2000" in the accident with report number "AR2197" to $3000.

b) What do you mean by Triggers? When Trigger should not be used? 2

c) What are the main components of query processor? 2

7. a) Consider the following relational database, where the primary keys are underlined 10

Loan = (*loan no*, branch_name, amount)
Borrower = (*customer name, loan no.*)
Account = (*account no*, branch_name, balance)
Depositor = (customer_name, *account no*)

Construct the following SQL queries for this relational database.

i. Find the list of all customers in alphabetic order who have a loan in the Mirpur branch.
ii. Find all customers of the bank who have an account but not a loan.
iii. Find branch name and average balance where average balance is greater than 1200.
iv. Find all customers who have a loan from the bank, find their names, loan numbers and loan amount.
v. Find the names of all customers who have a loan at the bank and whose names are neither *Smith* nor *Jones*.

b) What do you mean by Natural-Join Operation? Explain, 4

8. a) What do you mean by Normalization? How does Normalization eradicate update anomalies from a relation? 4

b) The second normal form (2NF) is realized by removing partial dependencies from 1NF relations. Briefly describe the term "partial dependency." 4

c) Describe the concept of functional dependency. What are the main characteristics of functional dependencies that are used for normalization? 4

d) Describe various types of attribute with example. 2

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Mawlana Bhashani Science and Technology University
Department of Information and communication Technology (ICT)
2nd Year 2nd Semester B.Sc. (Engg.) Final Examination-2015

Course Title: **Database Management System** Course Code: ICT-221(BL)
Time: **3 Hours** Marks: 70

N.B.:
i) Answer any five from the following questions
ii) The sequence should be maintained in answering each of the questions

1. a) What is database management system? Briefly describe the applications of database system. 4
   b) Describe the disadvantages may occur in keeping organizational information in file processing system rather than DBMS. 5
   c) What do you mean by data abstraction? Describe in detail different levels of data abstraction in DBMS. 3
   d) What is meta data? 2

2. a) What is data model? Briefly describe basic Entity-Relationship model with minimum required diagram. 3
   b) Describe different types of database system users. Among the users, who is database administrator and what are his functions? 6
   c) Explain the terms "Entity" and "Attribute" with suitable example. 3
   d) What is the difference between DDL and DML commands? 2

3. a) What is database deadlock? How can we avoid database deadlock possibilities? 4
   b) Describe the basic structure of SQL queries with general syntax and typical example. 4
   c) Consider the following employee database where primary keys are underlined. Give an SQL DDL definition of this database then write SQL expression for each of the queries given bellow. 6
      employee (*employee_name*, street, city)
      works (*employee_name*, company_name, salary)
      company (*company_name*, city)
      manages (*employee_name* manager_name)
      i. Find the **names** and **cities** of all employees who work in **abc bank ltd.**
      ii. Find the **names, street address** and **cities** of all employees who work in **abc bank ltd** and **earn more than BDT 50000.**

4. a) Explain the difference between physical and logical data independence? 3
   b) What is Data dictionary? What are the advantages and disadvantages of DBMS? 4
   c) What is Null value? List two reasons why null values might be introduced into the database. 3
   d) Explain Generalization and Specialization with example. 4

5. Consider the following relations: 14
   Employee (empNo, fName, lName, address, DOB, sex, position, deptNo)
   Department (deptNo, deptName, mgrEmpNo)
   Project (projNo, projName, deptNo)
   WorksOn (empNo, projNo, dateWorked, hoursWorked)

   Formulate the following queries into relational algebra.

   i. List all the details of employees who are female and born after 1990.
   ii. List all employees who are not managers and are paid more than $1500.
   iii. Produce a list of the names and addresses of all employees who work for the IT department.

iv. Produce a list of the names of all employees who work on the SCCS project.
v. Produce a complete list of all managers who are due to retire this year, in alphabetical order of surname.
vi. Find out how many managers are female.
vii. Produce a report of all projects under the IT department.

6. a) What is functional dependency (FD)? Explain Armstrong's axioms used to find logically implied functional dependency.   6
   b) What is RAID? Briefly explain the RAID Level 1 and RAID Level 2.   15min   5
   c) What do you mean by data mining? Write some applications of data mining.   3

7. a) Consider the following relational database, where the primary keys are underlined   14
   branch (branch_name, branch_city, assets)
   customer (customer_name, customer_street, customer_city)
   loan (loan_number, branch_name, amount)
   borrower (customer_name, loan_number)
   account (account_number, branch_name, balance)
   depositor = (customer_name, account_number)
   Construct the following SQL queries for this relational database.
   i. Find the names of all bank customers who have either an account or a loan or both.
   ii. Find all customers of the bank who have an account but not a loan.
   iii. Find the names of all customers who have a loan at the bank along with the loan number and amount.
   iv. Find the names of all customers who have a loan at the bank and whose names are neither Smith nor Jones.
   v. Update the records so that accounts with balances over $10,000 will receive 6% interest, whereas all others will receive 5%.
   vi. Find the total assets and maximum asset at each branch.
   vii. Find the number of depositors for each branch.

8. a) What is indexing? Describe its advantages and disadvantages.   3
   b) What is the basic concept of data warehousing? Data warehousing is only the viable means to resolve the information crisis and provide strategic information. List four reasons to support this assertion and explain them.   6
   c) What is transaction? Explain the transaction properties that are required for the database system to ensure integrity of the data?   5