Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No. .....

MCA–202

M. C. A. (Second Semester) EXAMINATION, June, 2008

DATABASE MANAGEMENT SYSTEM

(MCA – 202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : There are five Units. Attempt any *one* question from each Unit. All questions carry equal marks.

Unit – I

1. (a) Explain system structure of DBMS. 8
   (b) What are the major functions of DBA ? 5
   (c) Explain schema, instance, logical database design, data dictionary, data sublanguage. 7

Or

2. (a) Explain the following terms with examples. How they are represented in E-R diagram : 10
      (i) strong and weak entity
      (ii) partial and total participation
      (iii) cardinality limits
      (iv) discriminator and primary key
      (v) aggregation
   (b) Explain about data models. Explain various data models you know. 10

P. T. O.

Unit – II

3. (a) The outer join operations extend the natural join operation so that tuples from the participating relations are not lost in the result of join. Describe how that join operation can be extended so that tuples from left, right, or both relations are not lost from the result of theta join. 10

   (b) What is union compatibility ? Why do the UNION, INTERSECTION, SET DIFFERENCE operations require that the relations on which they are applied are union compatible ? 10

Or

4. Consider the relational database given below whose primary keys are underlined. Give expressions in relational algebra and SQL to express the following queries : 20

   Suppliers (SNO, SName, Status, City)

   Parts (PNO, PName, Color, Weight, City)

   Projects (JNO, Jname, City)

   Shipments (SNO, PNO, JNO, Qty)

   (i) Get full details for parts supplied by a supplier in 'Bombay'.

   (ii) Get total qty of part 'P1' supplied by supplier 'S1'.

   (iii) Get all pairs of city names such that a supplier in the first city supplies a project in the second city.

   (iv) Get supplier no for supliers with status lower than 'S1'.

   (v) For each part being supplied to a project, get part number, the project number, and the corresponding total quantity.

Unit – III

5. (a) Compute the closure of the following set F of functional dependencies for relation schema R = (A, B, C, D, E) : 10

$$A \rightarrow BC$$

$$CD \rightarrow E$$

$$B \rightarrow D$$

$$E \rightarrow A$$

Also compute candidate keys of R, B^+, and F_c (canonical cover).

(b) Consider the relation $r(x, y, z, w)$ and set $F = \{y \Leftrightarrow w, xy \rightarrow z\}$ where the symbol $\Leftrightarrow$ means $y \rightarrow w$ and $w \rightarrow y$ simultaneously. What are the candidate keys of this relation ?

What is the highest NF of the relation ? 10

Or

6. (a) Prove that every two-attribute relation is in BCNF. 6

(b) Consider the relation (x, y, z) and its decomposition $R_1(x, y)$ and $R_2(y, z)$. Assume that $x \rightarrow y$ and $z \rightarrow y$. Use the lossless join algorithm to determine if this decomposition is lossless or lossy. 10

(c) Discuss the data anomalies in 3 NF relations. 4

Unit – IV

7. (a) What is assertion ? How is it different from check and other constraints ? Write an assertion for the bank data base given below : 10

(i) The sum of all loan amounts for each branch must be less than the sum of all account balances at the branch.

P. T. O.

(ii) Every loan has at least *one* customer who maintains an account with a minimum balance of $ 10,000.

(b) Explain triggers. What is the need of triggers ? Give an example to explain the use of trigger. 10

Or

8. (a) What do you mean by transaction ? What are properties of transaction ? Explain the usefulness of each. 10

(b) Explain the distinction between serial schedule and serializable schedule. 10

Unit – V

9. (a) Explain the following : 5 each

(i) Object-oriented database

(ii) Data warehousing

(b) Differentiate between network and hierarchical models. 10

Or

10. (a) Explain about multimedia databases. 5

(b) Explain the basic idea of RAID organization and levels. 10

(c) Discuss indexing structure for files. 5

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA–202

M. C. A. (Second Semester)
EXAMINATION, June, 2007
DATABASE MANAGEMENT SYSTEM
(MCA–202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Differentiate between hierarchical, network and relational models. 6

   (b) Define the concept of aggregation. 6

   (c) Explain distinction between the following : 4 each

   (i) Disjoint and overlapping contraints of generalization and specialization

   (ii) Total and partial constraints

2. Consider the following database of supplier parts :

   S (SNo, SName, City, Status)

   P (PNo, PName, City, Weight, Color)

   SP (SNo, PNo, Qty)

   Supplier parts database.

P. T. O.

Solve the following queries in SQL and relational algebra.

(i) Get all pairs of suppliers who are located in same city. 2

(ii) Get supplier names who do not supply Part P1. 2

(iii) Get supplier names who supply all the parts. 2

(iv) Get supplier names who supply at least *one* 'Blue' Part. 2

(v) Get supplier numbers for supplier with status value less than the current maximum status value in 'S' table : 2

(vi) Get Part no. for all parts supplied by more than one supplier (only SQL). 1

(vii) Delete all suppliers in 'PARIS'. 2

(viii) Double the status of suppliers in LONDON. 2

(ix) Write SQL DDL for supplier part database. 5

3. (a) Explain with examples wherever necessary : 8

(i) Natural join

(ii) Equi join

(iii) Outer join

(iv) Inner join

(v) Left outer join

(vi) Right outer join

(vii) Theta join

(b) Design a relational database corresponding to the E-R diagram given ahead. 6

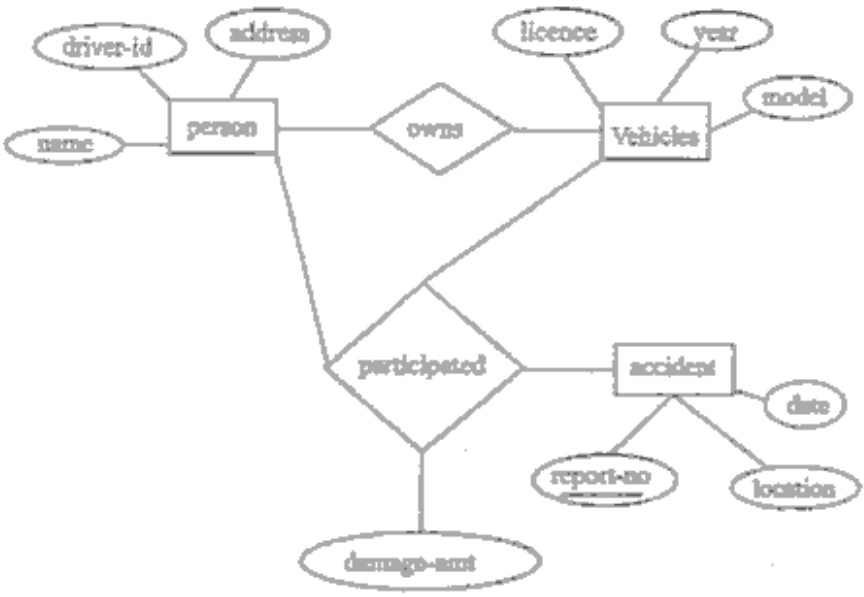


Fig. 1

(c) What is participation role ? What is it necessary to use role names in description of relationship type ? 6

4. (a) Prove that any relation with two attributes is in BCNF. 5

(b) Consider Relation R (A, B, C, D, E) and F set of functional dependency : 10

$$F\{A \rightarrow BC$$

$$CD \rightarrow E$$

$$B \rightarrow D$$

$$E \rightarrow A\}$$

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

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

(iii) Compute canonical cover of F i.e. F_C.

(c) Prove that functional dependency is also multivalued dependency. 5

P. T. O.

5. (a) Suppose that we decompose the schema : 15
R = (A, B, C, D, E) into :

(A, B, C)

(A, D, E)

Show that this decomposition is lossless join decomposition and not dependency preserving if the following FD's hold :

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

Also give non-loss and dependency preserving decomposition into 3 NF.

(b) What are trivial and non-trivial functional dependencies ? 5

6. (a) Explain the structure of B^+ trees Construct a B^+ tree for the following set of key values : 10

(2, 3, 5, 7, 11, 17, 19, 23, 29, 31)

(b) Explain multilevel indices. Also explain secondary indices. 10

7. (a) Explain the distinction between the terms serial schedule and serializable schedule. 7

(b) List the ACID properties. Explain the usefulness of each. 7

(c) Explain distributed database. 6

8. Write short notes on any *four* of the following : 20

(i) Data dictionary (ii) Mapping constraints

(iii) RAID (iv) DBTG model

(v) Transaction management

Total No. of Questions : 5] [Total No. of Printed Pages : 3

MCA–202

M. C. A. (Second Semester)
EXAMINATION, Nov.-Dec., 2007
DATABASE MANAGEMENT SYSTEM
(MCA–202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *two* parts of each question. All questions carry equal marks.

1. (a) Define Database Management System (DBMS). Discuss the responsibilities of DBA.

   (b) Software India Ltd. is an organization involved in the design, development and marketing of software products for a family of advanced personal computers. What entities are of interest to such an enterprise ? Give a list of these entities and the relationship among them.

   (c) Define the following :

   (i) E-R Model

   (ii) DBMS architecture

2. (a) Discuss different types of key. For each case, give a suitable example. What is a foreign key constraint ? Why is such constraint important ?

P. T. O.

(b) Explain the following :

(i) SQL and its operation

(ii) Relational calculus

(c) What do you understand by Querry processing and optimization ? Discuss in detail.

3. (a) Why do we need normalized data ? What is BCNF ? Discuss.

(b) Consider a relation R(A.B.C.D.E). The following dependencies are given :

$$A \rightarrow B, BC \rightarrow E, ED \rightarrow A$$

Find all keys of relations R. Is R in BCNF ? Justify your answer.

(c) Explain the following :

(i) Multivalued dependencies

(ii) Dependency preservation

4. (a) Discuss various transaction states with their description and state diagram.

(b) Explain the following :

(i) ACID properties

(ii) Checkpoints

(iii) Data fragmentation

(c) Enlist different schemes of database recovery and explain any *one* in detail.

5. (a) What do you understand by file organization ? Discuss different approaches of file organization along with their merits and demerits.

(b) Explain the following :

(i) Object Oriented Databases

(ii) Video servers

(iii) Data warehousing

(c) Explain the difference between each of the following :

(i) Primary versus secondary indexes

(ii) Dense versus sparse indexes

(iii) Clustered versus unclustered indexes

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA–202(O)

M. C. A. (Second Semester)
EXAMINATION, May/June, 2006
(Old Scheme)
DATABASE MANAGEMENT SYSTEM
[MCA – 202 (O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. Differentiate between the following : 4 each
   (a) File-Processing *vs* DBMS
   (b) Physical and Logical data independence
   (c) Weak and Strong Entity
   (d) Super key and Primary key
   (e) Immediate and deferred updation

2. (a) Construct an ER diagram for a university registrar's office. The office maintains data about each class, including the instructor, the enrollment and the time and the place of the class meetings. For each student-class pair, a grade is recorded. Document all

assumptions that you make about the mapping constraints. 12

(b) Explain the distinction between condition-defined and user-defined design constraints. Which of these constraints can the system check automatically ? Explain your answer. 8

3. (a) Let the following relation schemes be given : 12

$$R = (A, B, C) \qquad S = (D, E, F)$$

Let relations r (R) and s (S) be given. Give an expression in the tuple relational calculus that is equivalent to each of the following; also give the SQL equivalent :

(i) $\pi_A (r)$

(ii) $\pi_{A,F} (\sigma_{C = D} (r \times s))$

(iii) $r \times s$

(b) Describe the circumstances in which you would choose to use embedded SQL rather than using SQL alone or using only a general-purpose programming language. 8

4. (a) Show that, if a relation schema is in BCNF, then it is also in 3NF.

(b) List the three design goals for relational databases and explain why each is desirable.

(c) Explain why 4NF is a normal form more desirable than is BCNF.

(d) Explain how dangling tuples may arise. Explain problems that they may cause.

5. (a) Explain how the concept of object identity in the object-oriented model differs from the concept of tuple equality in the relational model.

(b) How does the remapping of bad sectors by disk controllers affect data retrieval rates ?

(c) What is the difference between a primary and a secondary index ?

(d) Construct a B^+-tree for the following set of key values : 6

2, 3, 5, 29, 31, 23, 19, 11, 7

6. (a) List the ACID properties. Explain the usefulness of each. 6

(b) During its execution, a transaction passes through several states, until it finally commits or aborts. List all possible sequences of states through which a transaction may pass. Explain why each state transition may occur. 8

(c) When a transaction is rolled back under time stamp ordering, it is assigned a new time stamp. Why can it not simply keep its old time stamp ? 6

7. (a) Explain the recovery procedure that needs to take place after a disk crash.

(b) How might a distributed database designed for a local area network differ from one designed for a wide-area network ?

(c) Make a list of security concerns for a bank. For each item on your list, state whether this concern relates to physical security, human security, operating system security or database security.

8. Write short notes on any *four* of the following :

(a) Network model

(b) Hierarchical model

P. T. O.

(c) Multivalued dependency

(d) RAID

(e) Triggers

(f) Data Dictionary

(g) Views

(h) Multimedia databases

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA–202(N)

M. C. A. (Second Semester)
EXAMINATION, May/June, 2006

(New Scheme)

DATABASE MANAGEMENT SYSTEM

[MCA – 202 (N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What is the difference between file processing system and database management system ? 8

   (b) Explain the role of Database Administrator. 6

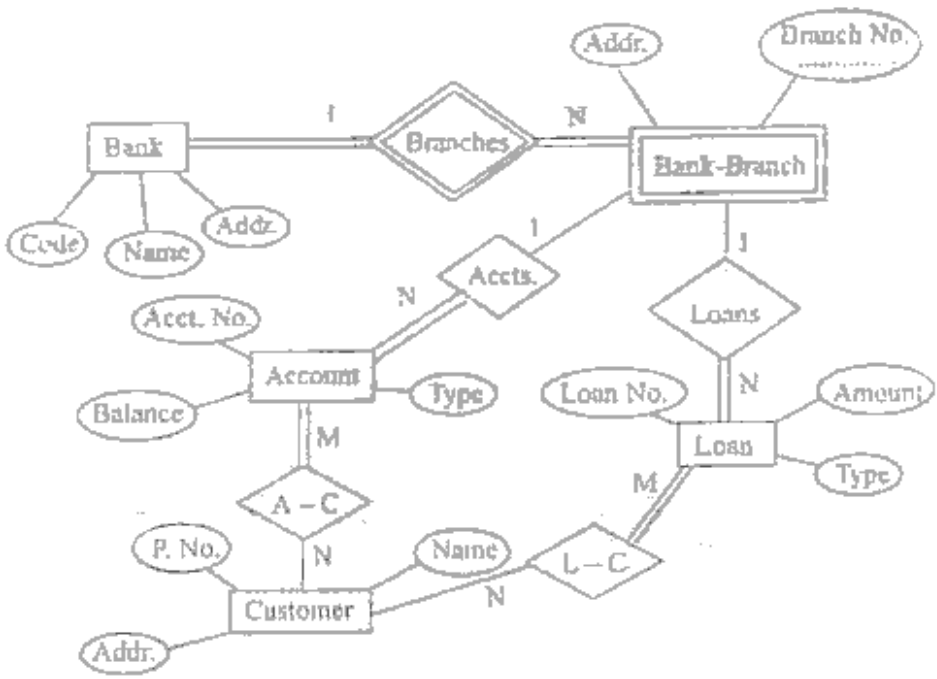
   (c) Explain data independence. 6

2. (a) What is Union Compatibility ? Why do UNION, INTERSECTION and SET DIFFERENCE operations require that the relations on which they are applied be union compatible. 10

   (b) Consider union, difference, product, selection and project operators as primitive relational algebra operators. Give definition of natural join, intersect and divide in terms of these primitives. 10

P. T. O.

3. Consider the ER diagram for a part of BANK database. Each bank can have multiple branches and each branch can have multiple account and loans.



Code, AcctNo, PNo, loan_no are underlined and are primary keys.

(i) List strong entity types in the ER diagram. 3

(ii) Is there any weak entity ? If so, give its name, partial key and identifying relationship. 3

(iii) List all names of relationship types. 4

(iv) Reduce the ER diagram to tables. 10

4. Consider the employee database :

Employee (P_name, street, city)

Works (P_name, company_name, salary)

Company (Company_name, city)

Manages (P name, Manager_name)

Employee-database

(a) Write SQL DDL for the above database. 13

(b) Write SQL statements for the following queries :

(i) Write on find names of all employees who work in 'FBC'. 1

(ii) Find names and cities of residence of all employees who work for "SBI". 1

(iii) Find the company that has smallest payroll. 2

(iv) Give all managers in the database 10% raise. 2

(v) Delete all types of 'works' relation for employees of 'SBI' 1

5. (a) Consider the relation R = { A, B, C, D, E, F, G, H, I J } and the set of functional dependencies :

$F = \{(A, B) \rightarrow C, A \rightarrow D E, B \rightarrow F, F \rightarrow G H, D \rightarrow I J\}$

Decompose R in 2 NF and 3 NF relations.

Also state 2 NF and 3 NF. 10

(b) Relvar R (A, B, C, D, E, F)

Satisfies the following FD's : 10

$A B \rightarrow C$

$C \rightarrow A$

$B C \rightarrow D$

$A C D \rightarrow B$

$B E \rightarrow C$

$C E \rightarrow F A$

$C F \rightarrow B D$

$D \rightarrow E F$

Find an irreducible equivalent for this set of FD's. Also find candidate keys of R.

6. (a) What are transactions ? What are the properties of transactions ? Discuss various transaction states. 10

   (b) Explain Referential Integrity. Also explain assertions and triggers with examples. 10

7. (a) Explain the nature of multimedia databases and applications. 10

   (b) Explain the difference : 10

   (i) Dense index and Sparse index

   (ii) Primary index and Secondary index.

   How indexes are created in SQL ?

8. Explain the following with examples : 20

   (i) Full functional dependency

   (ii) Partial dependency

   (iii) Join dependency

   (iv) Non-redundant cover

   (v) Minimal cover

   (vi) Canonical cover

   (vii) Prime attribute

   (viii) Transitive dependency

   (ix) Lossless decomposition

   (x) Multivalued dependency

Total No. of Questions : 8] [Total No. of Printed Pages : 3

MCA-202

M. C. A. (Second Semester) EXAMINATION, Dec., 2005

DATABASE MANAGEMENT SYSTEM

(MCA – 202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Define the following terms with example : 10
   (i) Degree of a relation
   (ii) Cardinality of a relation
   (iii) Primary key
   (iv) Domain
   (v) Super key

   (b) Describe the three-level architecture. How do different level schema definition language support this architecture ? 10

2. (a) A database is being constructed to keep track of the projects and categories of the project in the department. A project has number of employees, not all of whom participate in each category. It is desired to keep track of the employees participating in each category for each project, as the positions they

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participated and the result of the project. Design an ER diagram and write any assumptions that you make. 10

(b) What do you mean by indexing ? Define primary and secondary indexing. 10

3. (a) Define foreign key. What is this concept used for ? How does it play a role in the join operation ? 10

(b) Consider the following tables with primary key (underlined) :

Employee (Ename, Eno, Salary, Dno)

Department (Dno, Dname)

Project (Pno, Pname, Dno, Plocation)

Works_on (Eno, Pno, Hours)

Formulate the query in SQL to perform the following :

(i) For each project, retrieve the project number, the project name, and the number of employees from Department 5 who work on the project. 3

(ii) Count the number of distinct salary values in the database. 2

(iii) Find the name of employee who works on project name "DBMS" for more than 10 hours. 3

(iv) Find the sum of the salaries of all employees, the maximum salary, the minimum salary and the average salary. 2

4. (a) Discuss insertion, deletion and modification anomalies. Why are they considered bad ? Illustrate with examples. 10

(b) Prove that any relation schema with two attributes is in BCNF. 10

5. (a) What is the two-phase locking protocol ? How does it guarantee serializability ? 10

(b) Discuss the different types of transaction failures. What is meant by catastrophic failure ? 10

6. (a) What are the main reasons for and potential advantages of distributed databases ? 10

(b) What are the characteristics of data in a data warehouse ? 10

7. (a) Explain the object-oriented database model with the help of an example. 10

(b) Differentiate between B-tree, B^+-tree and B^*-tree. 10

8. Write short notes on any *four* of the following : 20

(a) Hierarchical model

(b) Relational calculus

(c) Database Administrator

(d) Multivalued Dependency

(e) Integrity Rules

(f) Deferred database modification

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA–202

M. C. A. (Second Semester) EXAMINATION, Dec., 2004

DATABASE MANAGEMENT SYSTEM

(MCA—202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Construct an E-R diagram for the database of a hospital with a set of patients and a set of medical doctors. Patients may be indoor as well as outdoor patients. Each patient a log of the various tests conducted is also associated. 12

   (b) Differentiate between the following : 8

   (i) Weak and Strong entity

   (ii) Generalization and Aggregation

2. (a) Define with example Super key, Candidate key, Foreign key and Primary key. 8

   (b) What is union compatibility ? What are the relational algebra operation that require the relations on which they are applied to union compatible ? 6

   (c) Consider the following relation : 6

   Student (Student no. Percentage, language)

   Discuss the circumstances in which this relation will be in 3NF but not in 4NF.

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3. (a) Give a lossless join decomposition of the schema R (A, B, C, D, E) into BCNF. This relation holds the following functions dependencies :

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

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

$$A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow A$$

List the candidate keys for R.

(c) Why are Armstrong's inference rules important ?

4. (a) Draw a state diagram and discuss the typical states that a transaction goes through during execution. 8

(b) Consider the following relations : 8

Employee (Eno, Ename, salary, Dno)

Department (Dno, Dname, Budget)

Project (Pno, Pname, Dno, Plocation)

Works on (Eno, Pno, Hours)

Use any *one* language to answer the following queries :

(i) Change the locations and controlling department number of project number 10 to "Bombay" and 5 respectively.

(ii) For each department, retrieve the department name and the average salary of employees working in that department.

(iii) For each project on which more than two employees work retrieve the project number, project name and number of employees who work on that project.

(iv) Get the employees name and departmental budgets for employees.

(c) What is meant by transaction rollback ? Which recovery techniques do not require rollback ? 4

5. (a) Construct a B^+ tree for the following set of key values : 12

(5, 7, 11, 18, 20, 25, 28, 30, 35)

assuming that the tree is initially empty, values are added in the ascending order in a B^+ tree of order $p = 4$ and $d = 3$. Show the form of the tree after each of the following series of operations :

(i) Insert 9

(ii) Delete 28

(b) Discuss the timestamp ordering protocol for concurrency control. 8

6. (a) What is meant by data allocation in distributed data base design ? What typical units of data are distributed over sites ? 8

(b) What are the main differences between designing a relational database and an object database ? 5

(c) Write down the brief note on Mobile Databases. 7

7. (a) What is partitioned hashing ? How does it work ? What are its limitations ? How can hashing be used to construct an index ?

(b) Compare the Relational, hierarchical and Network models.

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8. Write short notes on any *four* of the following :
   (a) Relational Calculus
   (b) Views in SQL
   (c) DataBase Administrator
   (d) Recovery concepts based on deferred update
   (e) Data Independence

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA–202

M. C. A. (Second Semester) EXAMINATION, June, 2004

DATABASE MANAGEMENT SYSTEM

(MCA – 202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Describe the three-schema architecture. Why do we need mappings between schema levels ? How do different schema definition language support this architecture ? 12

   (b) Consider the following two sets of functional dependencies :

   $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$

   $G = \{A \rightarrow CD, E \rightarrow AH\}$

   Check whether they are equivalent ? Justify your answer. 8

2. (a) Design an EER schema for a database application that you are interested in. Specify all constraints that should hold on the database. 14

   Make sure that the schema has at least five entity types, four relationship types, a weak entity type, a

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super class/subclass relationship, a category and an n–array ($n > 2$) relationship type.

(b) What is a participation role ? When is it necessary to use role names in the description of relationship types ? 6

3. (a) What do you mean by Boyce-Codd normal form. How does it differ from 3 NF ? Prove that any relation schema with two attributes is in BCNF. 10

(b) What is the dependency preservation property for a decomposition ? Between the properties of dependency preservation and losslessness, which one must be definitely satisfied ? Why ? 6

(c) Prove that a functional dependency is also a multivalued dependency. 4

4. (a) Discuss the immediate update recovery technique in both single-user and multi-user environments. What are the advantages and disadvantages of immediate update ? 10

(b) Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering ? 10

5. (a) Construct a B^+ tree for the following set of key values : 10

(4, 12, 17, 30, 31, 35, 47)

assuming that tree is initially empty, values are added in ascending order and the number of pointers in one node is 3. Also perform the following operations on B^+ tree :

(i) insert 20 (ii) insert 32 (iii) delete 17 (iv) delete 47

(b) Why can we have at most one primary or clustering index on a file, but several secondary indexes ? 10

6. (a) Consider the following tables with primary key (underlined) : 10

Employee (ENo, Ename, Salary, DNo)

Department (DNo, Dname)

Project (PNo, Pname, DNo, Plocation)

Works on (ENo, PNo, Hours)

Formulate in SQL to perform the following.

(i) For each project list the project name and total hrs/week (by all employees) spend on that project.

(ii) Modify the hours attribute with ENo = 2315 and PNo = 1704 to "20·00".

(iii) Retrieve the employee names whose salary is more than that of "Black" and works on more than 2 project.

(iv) Find the names of employees who work on all projects controlled by department number 5.

(v) Insert P5 for PNo 2404 for DNo into the relation project.

(b) Give the Relational Algebra, Tuple calculus and domain calculus solution to the following queries : 6

(i) Retrieve the names of all employees in department 5 who work more than 10 hours on the product X project.

(ii) Retrieve the employee name of all employees who work for the "Research" department.

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(c) Expain the following with the help of an example : 4

(i) Full outer join

(ii) Right outer join

7. (a) What do you mean by fragments ? Why is fragmentation a useful concept in distributed database design ? 5

(b) What is data-mining and how does data-mining technology relate to data warehousing technology ? 5

(c) Discuss grant and revoke statements of security. 5

(d) What are the basic advantages and disadvantages of Network model over relational model ? 5

8. Write short notes on any *five* of the following : 4 each

(a) Multimedia data formats

(b) Triggers

(c) RAID

(d) Deadlocks and livelocks

(e) Closure set of multivalued dependency

(f) Object-oriented database

(g) Check points and Data Dictionary

Total No. of Questions : 8] [Total No. of Printed Pages : 4

MCA – 202

M. C. A. (Second Semester) EXAMINATION, Dec., 2003

DATABASE MANAGEMENT SYSTEM

(MCA – 202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks. Neat and to the point answers will fetch maximum marks.

1. (a) Differentiate between relational and traditional file.
   (b) What do you understand by Data Independence ?
   (c) Explain each of the following organization to represent data at storage level :
      (i) Heap organization
      (ii) Hashed file organization
      (iii) Multilist and Inverted organization

2. (a) How will you reduce the following in E – R schema to tables ?
      (i) Strong Entity (ii) Weak Entity
      (iii) Relationship sets (iv) Generalization
      (v) Aggregation (vi) Multivalued attributes
   (b) Explain mapping constraints.

P. T. O.

3. (a) Define the following and also give examples :

(i) Super key (ii) Primary key

(iii) Candidate key (iv) Alternate key

(v) Domain (vi) Attribute

(vii) Foreign key (viii) Composite key

(ix) Entity (x) Relation

(b) Explain the following with examples :

(i) Natural Join (ii) Equi Join

(iii) Left Outer Join (iv) Right Outer Join

(v) Full Outer Join

4. (a) S, P, SPJ, J as shown in Relational Schema are the relations of a database containing informations of suppliers, parts, projects. Significance of SPJ record is that the specified suppliers supply the specified part to specified project in specified quantity :

Relation S (S#, SName, City, Status)

Primary key S#

Relation P (P#, PName, Color, Weight, City)

Primary key (P#)

Relation SPJ (S#, P#, J#, Qty)

Primary key (S#, P#, J#)

Relation J (J#, JName, City)

Primary key J#

Formulate in SQL and Relational Algebra to perform the following :

(i) Get P# for parts such that no other part has a smaller weight value

(ii) Get P# and names of cities supplying the part

(iii) Get P# for all the parts who are supplied to both projects 'J1' and 'J2'

(iv) Get pairs of suppliers who are located in same city

(v) Get J# values for projects supplied by at least one supplier not in same city.

(b) Give triple calculus and domain calculus solution to the following queries for the relation S, P, J and SPJ give in Q. 4 :

(i) Get supplier names for suppliers who do not supply part 'P2'

(ii) Get supplier names, for suppliers who supply at least one 'red' part

(iii) Get supplier names for supplier who supply at least one part supplied by supplier 'S2'

5. (a) A relation 'Time Table' is defined with the following attributes :

D Day of week (1–5)

P Period within day (1–8)

C Classroom number

T Teacher Name

S Student Name

L Lesson identifier

A tuple $<d, p, c, t, s, l>$ is the element of this relation if at time $<d, p>$ student s is taught lesson l by teacher t in classroom c. You may assume that the lessons are one period in duration and that every lesson has an identifier that is unique among all lesson taught in the week. Reduce 'Time Table' to more desirable structure.

(b) Explain Normalization, non-less decomposition.

(c) Explain how dangling types may arise. Explain problems that they may cause.

6. (a) Explain entity, integrity and referential integrity. Also explain on delete cascade and on update cascade.

(b) Explain functional dependency and trivial functional dependency.

(c) Compute the closure of the following set F of functional dependency for relation schema $R = \{A, B, C, D, E\}$:

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

List the candidate keys in R and canonical cover F_C.

7. (a) List the ACID properties. Explain the usefulness of each.

(b) What are transaction commit points and why they are important ?

(c) Discuss the time stamp ordering protocol for concurrency control.

8. Write short notes on any *four* of the following :

(i) Deadlocks

(ii) RAID

(iii) Data mining

(iv) Database Architecture

(v) Distributed databases

Total No. of Questions : 8] [Total No. of Printed Pages : 3

MCA–202

M. C. A. (Second Semester) EXAMINATION, June, 2002

DATA BASE MANAGEMENT SYSTEMS

(MCA–202)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. Differentiate between the following : 4 each
   (a) File processing and Database Management system
   (b) Strong and weak entity
   (c) Generalization and aggregation
   (d) Functional dependency and multivalued dependency
   (e) Network and Hierarchical models

2. (a) What are the functions of DBA ? Explain. Also explain data dictionary. 10
   (b) Explain the term 'data independence'. Also explain various views of data. 10

3. (a) What are the various ways in which a collection of sample data can be represented at storage i. e. internal level ? Explain each of them. 10

P. T. O.

(b) What do you mean by data fragmentation in distributed database ? Explain horizontal, vertical and mixed fragmentation. 10

4. (a) Consider following tables with primary key (under lines) : 10

(i) Employee (Eno, EName, DNO, Salary)

(ii) Dept (Dno, Dname)

Answer the following queries using SQL.

(i) Get departments without Employees.

(ii) Get dept and average salary of each department.

(iii) Give all employees of Dept D7 a raise of 20% salary.

(iv) Delete the department D8.

(v) Get employee names for employees that either get salary more than 30,000 or are working in dept D8.

(b) Explain the various element of tuple calculus impression. Also explain free and bound variables. 10

5. (a) Consider the following relation :
Student (Student No, Subject; Percentage)
Discuss the circumstances in which this relation will be in 3NF and not in 4NF. 5

(b) What is the need of normalization ? Explain with the help of examples fourth and fifth normal firms. 10

(c) Decompose the following relation 'S' into equivalent collection of 2NF relation : 5

S (S#, status, city) with following FDs

S# → status

City → status

6. (a) Explain object oriented database. Explain its structure. 10

   (b) What do you mean by data warehousing ? What are its characteristics ? 10

7. (a) Explain various general indexing techniques. 10

   (b) Draw a state diagram and discuss the typical states that a transaction goes through during execution. 10

8. Write short notes on any *four* of the following : 5 each

   (i) Database administration

   (ii) Deadlocks

   (iii) Recovery concepts

   (iv) Two phase locking system

   (v) Data Dictionary

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