Subject: DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours **Max. Marks: 100**

JUNE 2011

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. A candidate key which is not primary key is_____

(A) Unique key **(B)** Secondary key
(C) Alternate key **(D)** None of these.

b. A virtual table derived from one or more underlying base tables is_____

(A) Alternate table **(B)** View
(C) Relational table **(D)** None of these

c. SQL is a

(A) Pseudo language **(B)** Non procedural language
(C) Procedural language **(D)** Both **(B)** & **(C)**

d. The join, in which columns are compared for equality is called

(A) Equi-join **(B)** Outer join
(C) Natural join **(D)** Both **(A)** & **(C)**

e. The basic storage units within a RDBMS are

(A) Row **(B)** Table
(C) Cell **(D)** All of above

f. _____ are the files that keep track of location of each row or group of rows in the table.

(A) Primary key **(B)** Indexes
(C) Unique key **(D)** Both **(B)** & **(C)**

g. ALTER TABLE command is used to

(A) Add a column
(B) Add an integrity constraint
(C) Redefine a column
(D) All of above

h. What is a tuple?

(A) An attribute attached to a record.
(B) A row or record in a database table.
(C) Another name for the key linking different tables in a database.
(D) Another name for a table in a RDBMS.

i. In the relational model, the number of rows in a table is termed as

(A) cardinality
(B) degree
(C) domain
(D) None of these

j. In the hierarchical database, the _____can be located using the hashing function.

(A) child nodes
(B) primary key
(C) root
(D) None of these

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. What is integrity constraint? Explain any two integrity constraint? **(4)**

b. List four significance differences between a file processing system and a DBMS. **(4)**

c. Explain the difference between strong and weak entity sets. Why sometimes weak entity sets are needed in database design? **(4)**

d. What are the responsibilities of a database administrator? **(4)**

Q.3 a. Consider the following relational schema:

student(id, name)
enrolledin(id, code)
subject(code, lecturer)

Write the queries in relational algebra

(i) What are the names of students who are taking a subject *not* taught by Roger?
(ii) List the names of all the students in the subject with code *cp1500*?
(iii) What are the names of students in both *cp1500* and *cp1200*?
(iv) Which subjects are *Hector(student)* taking? **(4×3)**

b. What is an outer join? Discuss the different types of outer joins with the help of examples? **(4)**

Q.4 a. Define a view? How is it different from a table? Write the SQL syntax for creating a view? **(4)**

b. Consider the employee database, where the primary keys are underlined. Give an expression in SQL for each of the following queries.

Employee (*employee_name*, *street*, *city*)
Works (*employee_name*, *company name*, *salary*)
Company (*company_name*, *city*)
Manages (*employee_name*, *manager name*)

(i) Find the names of all employees who work for *First Bank Corporation*.
(ii) Find all employees in the database who live in the same cities as the companies for which they work
(iii) Find all employees who earn more than the average salary of all employees of their company
(iv) Find the company that has the smallest payroll **(4×3)**

Q.5 a. What is a multivalued dependency? What types of constraint does it specify? When does it arise? **(4)**

b. A relation R has attributes A, B, C, D, E, F, G, H, I, J, and satisfies the following FDs:

$ABD \rightarrow E$
$AB \rightarrow G$
$B \rightarrow F$
$C \rightarrow J$
$CJ \rightarrow I$
$G \rightarrow I$

What are the candidate keys? Is this an irreducible set of FDs? **(6)**

c. Give an example of a relation that is in 3NF but not in BCNF. **(6)**

Q.6 a. What is a B-tree? How does the B^+ tree differ from a B-tree? Which of the two structures preferred as an access structure in database management and why? **(6)**

b. What are the advantages of using an index and what are its disadvantages? **(6)**

c. What is an indexed-sequential file? **(4)**

Q.7 a. Explain query optimization and its significance in DBMS. Why SQL queries are converted into relational algebra queries before optimization is done? **(8)**

b. What is meant by heuristic optimization? Discuss the main heuristics that may be applied during query optimization. **(8)**

Q.8 a. What properties a transaction must have? **(5)**

b. Describe each of the following locking protocols: two phase protocol, strict two phase protocol. **(6)**

c. Why is concurrency control needed? Explain with the help of an example when do two transactions running concurrently conflict? **(5)**

Q.9 a. What is the difference between the two log-based recovery schemes, immediate update and deferred update? What are the similarities? **(8)**

b. What is the shadow page recovery scheme? How does it compare with the log-based recovery techniques in terms of ease of implementation and overhead costs? **(8)**