Subject: DATABASE MANAGEMENT SYSTEMS

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

DECEMBER 2010

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 half an hour 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. 2NF is based on the concept of _____ dependency.

(A) functional dependency **(B)** transitive dependency
(C) Both **(A)** and **(B)** **(D)** None

b. A relational schema R is in _____ if whenever a nontrivial functional dependency $X \rightarrow A$ holds in R, then X is a superkey of R.

(A) 1NF **(B)** 2NF
(C) 3NF **(D)** BCNF

c. The _____ command sets the file pointer of an opened file to the beginning of the file.

(A) find **(B)** reset
(C) get **(D)** set

d. The technique involving application of arithmetic or logical function to calculate hash address is called _____.

(A) discrete **(B)** folding
(C) exclusive **(D)** joining

e. Join involving more than two files is called _____.

(A) two-way join **(B)** multiway join
(C) aggregate join **(D)** None

f. The problem where one transaction reads a database item updated by another uncommitted transaction is called _____.

(A) pseudo read **(B)** dirty read
(C) intermediate read **(D)** None

g. A transaction enters into _____ state immediately after it starts executing.

(A) read **(B)** write
(C) active **(D)** commit

h. A schedule S is _____, if for every transaction T participating in the schedule, all the operations of T are executed consecutively in the schedule.

(A) serial **(B)** non serial
(C) consecutive **(D)** pipelined

i. Which of the following is not characteristic of a relational database model?

(A) Tables **(B)** Treelike structure
(C) Complex logical relationships **(D)** records

j. Which of the following is not the responsibility of the utilities component of DBMS software?
(A) Creating the physical and logical designs
(B) Removing flagged records for deletion
(C) Creating and maintaining the data dictionary
(D) Monitoring performance

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

Q.2 a. Differentiate between the following:
(i) Database schema and a database state (ii) DML (data manipulation language) and DDL (data definition language) **(4+4)**

b. Explain the different types of constraints specified on relational databases. **(4)**

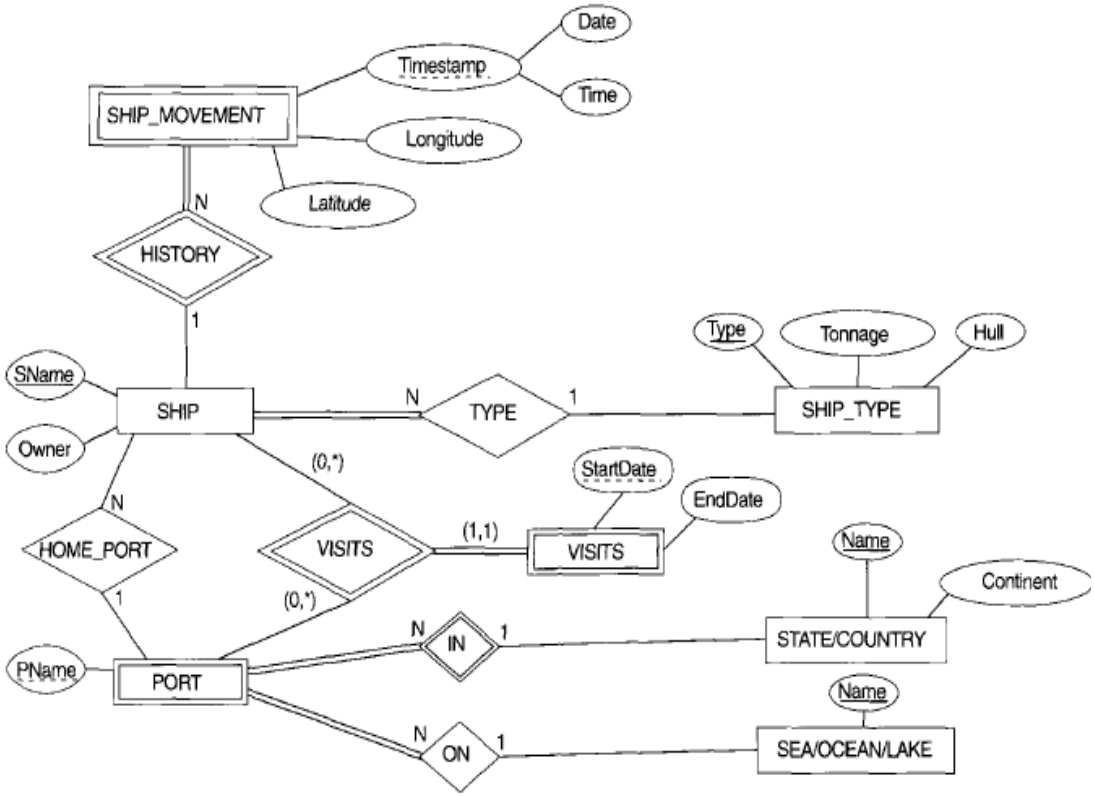
c. Explain the operation of a two tier client/server architecture for RDBMS. **(4)**

Q.3 a. Explain the **select** and **project** operations of relational algebra with examples. **(8)**

b. Define the following terms with respect to the tuple calculus:
tuple variable, range relation, atom, formula and expression. **(8)**

Q.4 a. Describe the steps of the algorithm used in ER-to-relational mapping. **(8)**

b. Following Figure shows an ER schema for a database that may be used to keep track of transport ships and their locations for maritime authorities. Map this schema into a relational schema, and specify all primary keys and foreign keys. **(8)**



Q.5 a. Consider the following database, where primary keys are underlined.

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 SQL expression for each of the following queries:

(i) Find the total number of people who owned cars that were involved in accidents in 1989.

(ii) Add a new accident to the database; assume any values for required attributes.

(iii) Delete the Mazda belonging to "John Smith" **(9)**

b. Mention the aggregate functions used in SQL with suitable examples. **(7)**

Q.6 a. What are the advantages of ordered files over unordered files? **(4)**

b. What is the order p of a B-tree? Describe the structure of B-tree nodes. **(4)**

c. What is meant by the term heuristic optimization? Discuss the main heuristics that are applied during query optimization. **(8)**

Q.7 a. Describe the shadow paging recovery technique under what circumstances does it not require log? **(8)**

b. Define functional dependency and explain how would you use it in relational database design. **(8)**

Q.8 a. Explain Second Normal Form (2NF) with appropriate examples. **(8)**

b. Explain Third Normal Form (3NF) with suitable examples. **(8)**

Q.9 a. Explain lost update and temporary update problems with illustrations. **(8)**

b. Explain with a neat diagram, different states of a transaction. **(8)**