(3 Hours) [Total Marks : 100]

N.B. : (1) Question No. 1 is **compulsory**.
     (2) Answer any **four** out of the remaining questions.
     (3) Assume any **suitable data** if necessary and clearly state it.

1. a) Discuss the advantages of Database system over File system. [05]
   b) What is strong entity and weak entity? Explain with example. [05]
   c) Explain different features of GUI. [05]
   d) What is a view? Write syntax to create view using SQL. [05]

2. a) Consider a car-insurance company whose customers own one or more cars each.
     Each car has associated with it zero to any number of recorded accidents.
     i) Design an EER schema, stating any assumptions you make. [05]
     ii) Show mapping of EER schema to relational schema. [05]
   b) Explain following relational algebra operators with example: [10]
     i) Project   ii) Rename   iii) Division   iv) Natural Join   v) Set Difference.

3. a) Explain different states and properties of transaction. [10]
   b) What is a deadlock? Explain different techniques to prevent and recover
     from the deadlock. [10]

4. a) Consider the following global schema which keep track of airline flight information.
     Answer the following queries in SQL:
     Flights (*flno, from, to, distance, departs, arrives, price*)
     Aircraft (*aid, aname, cruisingranger*)
     Certified (*eid, aid*)
     Employees (*eid, ename, salary*) [10]
     i) Find the names of pilots certified for some Boeing aircraft.
     ii) Find the *aid*s of all aircraft that can be used on routes from Mumbai to Delhi.
     iii) Find the names of pilots whose *salary* is less than the price of the cheapest route
        from Mumbai to Chennai.
     iv) For each pilot who is certified for more than three aircraft, find the *eid*
        and the maximum *cruisingrange* of the aircraft for which she or he is certified.
   b) Explain the use of logs and check points for recovery in a database. [10]

5. a) Explain Murphy's Law of GUI design. [05]
   b) Write a note on Activex Data Object (ADO). [05]
   c) What is serializable schedule? Describe with suitable example different
     types of serializable schedule. [10]

6. a) What is concurrency control? Explain the two phase locking protocol and
     graph based protocols. [10]
   b) Explain the shadow page recovery technique. [05]
   c) Write a note on icons and graphics. [05]

7. Write short note on: [20]
     a) Responsibilities of Database Administrator.
     b) Generalization and Aggregation.
     c) Listbox, Combobox, Checkbox controls of VB.
     d) Referential integrity in SQL.