

- Instructions: 1. All questions are compulsory.  
2. Figures to the right indicate maximum marks.  
3. Start each question on fresh page.

Q1. Define the following (5 x 2 = 10)

- a) Data Dictionary
- b) Database schema
- c) Referential Integrity
- d) Data Mining
- e) Bioinformatics

Q2. Answer the following

- a) Mention any four functions of a database (2)
- b) Differentiate between Data Definition Language (DDL) and Data Manipulation Language (DML). Illustrate each with a suitable command. (3)
- c) Briefly describe each type of users of DBMS and their interaction with DBMS with a suitable diagram (5)

Q3. Answer the following

- a) Compare and contrast Network and Hierarchical data models (2)
- b) Define Distributed Databases. Discuss advantages and disadvantages of data replication. (3)
- c) Construct an E-R diagram for 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. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received. (5)

Q4. Answer the following

- a) Mention different types of attributes and give an example of each (2)
- b) With a suitable diagram discuss the states of a transaction (3)
- c) Consider the following relation:  
CAR\_SALE(Car#, Date\_sold, Salesperson#, Commission%, Discount\_amt)  
Assume that a car may be sold by multiple salespeople, and hence {Car#, Salesperson#} is the primary key. Additional dependencies are  
Date\_sold → Discount\_amt and  
Salesperson# → Commission%  
Based on the given primary key, is this relation in 1NF, 2NF, or 3NF? Why or why not? Normalize it successively upto 3NF. State the reasons behind each decomposition. (5)

Q5. Answer the following

- a) Write a short note on locks in transactions (2)
- b) Discuss the ACID properties of transactions (3)
- c) Discuss characteristics, challenges and data requirements of a mobile database (5)