

N.B. : (1) Question No. 1 is **compulsory**.

(2) Attempt any **four** questions out of remaining **six** questions.

(3) Assume any **suitable** data wherever **required** but justify the **same**.

1. (a) State difference between a weak and a strong entity set. 3
 (b) We can convert any weak entity set to a strong entity set by simply adding 12
 appropriate attributes. Why, then, do we have weak entity sets ?
 (c) Explain the distinction between condition-defined and user-defined constraints. 5
 Which of these constraints can the system check automatically ? Explain
 your answer.

2. (a) Construct an E-R diagram for a car-insurance company that has a set of customers, 10
 each of whom owns one or more cars. Each car has associated with it zero to
 any number of recorded accidents. Design the relational database describing
 various set of constraints.

- (b) Consider the following relational database :- 10
 employee (person-name, street, city)
 works (person-name, company-name, salary)
 company (company-name, city)
 manages (person-name, manager-name)

Give a relational-algebra expression for each of the following queries :

(i) Find the company with the most employees.

(ii) Find the company with the smallest payroll.

(iii) Find those companies whose employees earn a higher salary, on
 average, than the average salary at ABC company.

3. (a) Describe the circumstances in which you would choose to use embedded SQL 10
 rather than SQL alone or only a general-purpose programming language.
 (b) Perhaps the most important data items in any database system are the passwords 10
 that control access to the database. Suggest a scheme for the secure storage
 of passwords. Be sure that your scheme allows the system to test passwords
 supplied by users who are attempting to log into the system.

4. (a) We decompose the schema $R = (A, B, C, D, E)$ into - 10
 (A, B, C)
 (A, D, E)

Show that this decomposition is a lossless-join decomposition if the following
 set F of functional dependencies holds :-

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

- (b) Draw and explain database system architecture.

10

5. (a) How does the concept of an object in the object-oriented model differ from the concept of an entity in the entity-relationship model ? **10**
- (b) What is the difference between Persistent and Transient objects ? How is persistence handled in typical object oriented system. **10**
6. (a) Explain transaction processing in database system. **10**
- (b) Explain deadlock handling in database system. **10**
7. Write short notes : **20**
- (a) Two-phase locking protocol
 - (b) Comparision of RDBMS, OODBMS, ORDBMS
 - (c) OQL
 - (d) Timestamp-ordering protocol.
