COMP 5 – 5 (RC)

T.E. (COMP) (Sem. – V) (RC) Examination, May 2010
DATABASE MANAGEMENT SYSTEM

Duration: 3 Hours | Total Marks: 100

MODULE – 1

1. a) With the help of neat diagram explain the main phases of database design. **5**

   b) Define the following terms with appropriate examples : **10**

   1) Entity
   2) Attributes
   3) Relationship
   4) Instance
   5) Metadata.

   c) Explain the concepts of Generalization and Aggregation used in ER with the help of examples. **5**

2. a) Consider a database used to record the marks that students get in different exams of different course offerings. Construct an E-R diagram that models exams as entities and uses a ternary relationship for the above database. **8**

   b) Explain the difference between a weak and a strong entity set. **4**

   c) Construct an ER diagram in which the same entity set appears several times. Why is allowing this redundancy a bad practice that one should avoid whenever possible ? **8**

MODULE – 2

3. a) Consider the following tables. The primary keys are underlined.

   Singers : SingerId, Name, Language
   Songs : SongId, Title, Mood
   Relationship : SongId, SingerId, Year **10**

   Answer the following using Relational Algebra :

   1) Find names of all singers who have sung songs with blue mood.
   2) Find names of all singers who have sung blue and cheerful songs.
   3) Find names of all singers who have sung blue or cheerful songs.
   4) Find names of all singers who have sung only blue songs.
   5) Find names of all singers who have sung songs of every mood.

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b) Define foreign key. What is this concept used for ? How does it play role in join operations ? 5

c) How is view defined in SQL ? Give examples. 5

4. a) Specify the following relational algebra operations in both tuple and domain relational calculus : 12

a) $\sigma_A = C(R(A, B, C))$ b) $\pi_{<B, A>}(R(A, B, C))$

c) $R(A, B, C) * S(C, D, E)$ d) $R(A, B) \div S(A)$

e) $R(A, B, C) - S(A, B, C)$ f) $R(A, B, C) \times S(D, E, F)$

b) Explain the pitfalls of bad relational database design. 5

c) What is COBE and how does it differ from SQL ? 3

MODULE – 3

5. a) What is a query plan ? 5

b) What are the elements in estimating the cost of a query plan ? 5

c) Explain the use of heuristics in query optimisation. 10

6. a) Explain binary sorting for executing query operations. 5

b) What do you mean by BCNF ? How it is different from 4^{th} normal form ? 5

c) Explain 3NF with an example. 5

d) Explain the concept of join dependencies and fifth normal form. 5

MODULE – 4

7. a) Explain why concurrency control is needed ? And state different techniques used. 10

b) List and explain the desirable properties of transactions. 5

c) Illustrate "serializability with examples". 5

8. a) What is 2PL protocol ? How does it guarantee serializability ? 5

b) Discuss the wait-die and wound-wait protocols for deadlock prevention. 5

c) Discuss the problems of deadlock and starvation and the different approaches used in dealing with this problem. 10