



## 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

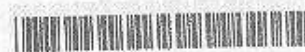
3. a) Consider the following tables. The primary keys are underlined.  
Singers : SingerId, Name, Language  
Songs : SongId, Title, Mood  
Relationship : SongId, SingerId, Year 10

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)  $\pi_{\langle B, A \rangle}(R(A, B, C))$
- 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<sup>th</sup> 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