

## BCSE 3<sup>rd</sup> Yr. 1<sup>st</sup> Sem. Special Supplementary Exam. -2017 (OLD)

### Database Management Systems

Full marks: 100

Time: 3 hours

#### Attempt any five questions

- 1) a) What are the advantages of using DBMS over conventional file processing system? 5  
 b) Define primary key and foreign key. 3+4  
 c) What are the functions of Database Manager and DML pre-compiler? 4+4
- 2) a) Define relation schema and relation state in relational model. 6  
 b) Consider the following relations: DEPT(DCODE, DNAME) and EMP(ECODE, ENAME, DCODE, BASIC\_PAY, DESIGNATION).  
 i) Write down the relational algebra and relational calculus expression to find the name of the employees who work in the department named as COMPUTER SCIENCE. 3+3  
 ii) Write down the relational algebra expression to display DCODE and corresponding total basic pay for each department. 3  
 c) Define union compatibility of two relations. 3  
 d) What is natural join? 2
- 3) a) Define weak entity type and how will you design the table for it? 6  
 b) Draw an ER diagram for a system that stores the information about the supervisors and students. Each supervisor has unique id and each student has unique roll. Name, e-mail id and phone number of each student and supervisor are stored. A supervisor may guide number (zero or more) of students. It is mandatory that a student is guided by one supervisor. The system keeps the information about which supervisor is guiding which student(s).  
 Design the necessary tables (optimally). Write down the SQL statements to create those tables. 4+4+6

#### 4) Consider the tables shown in Question 2(b).

Write down the SQL statement for the following:

- a) For each department show the name of the department and corresponding total basic pay. 5  
 b) Delete the records from DEPT table provided nobody is working there. 5

- c) Find the name of the employees working in the department named as COMPUTER SCIENCE. 5
- d) Find the name of the departments in which employee with SCIENTIST designation works. 5
- 5) a) What is functional dependency? 3
- b) Consider a schema  $R(A, B, C, D, E, F, G, H)$ . The following are the functional dependencies that hold on it:  
 $A \rightarrow C, D, G$      $AB \rightarrow F, H$      $B \rightarrow E$   
 Find out a candidate key. 4
- c) Why normalization is essential? 5
- d) Consider a schema  $R(A, B, C, D, E, F)$ . Each attribute is atomic and single valued. AC is the only candidate key for the schema. Further consider the following FDs:  
 $C \rightarrow B, D$      $E \rightarrow F$   
 Normalize the schema (show the steps) up to 3NF. Indicate PK and FK at each stage. 8
- 6) a) Compare the following: i) ordered and unordered file, ii) primary and secondary indexing. 3+4
- b) Two large relations are to be joined. Mention the name of the optimal join strategies for the cases: i) Relations are sorted on joining attribute and ii) They are not sorted on joining attribute. No index file is there. For both the cases also specify the number of disk block accesses required. 6
- c) Describe ACID properties of transaction and its different states. 3+4
- 7) a) Why is concurrency control required? 5
- b) Describe log based recovery mechanism for a concurrent environment. 10
- c) Discuss security feature of DBMS. 5
- 8) Write short notes on the following:
- a) Timestamp based protocol for concurrency control 8
- b) Database Trigger 4
- c) Utility of PL/SQL 4
- d) Cascading rollback 4