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15CS53

## Fifth Semester B.E. Degree Examination, Feb./Mar. 2022 Database Management Systems

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Describe the various advantages of using the DBMS approach. (08 Marks)
- b. Describe the three schema architecture. Why do we need mappings among schema level? How do different schema definition languages support this architecture? (08 Marks)

OR

- 2 a. Describe the component modulus of a DBMS and their interactions with block diagram. (08 Marks)
- b. What is the significance of role names in the relationship? In what situation role names are essential? Explain with example. (08 Marks)

### Module-2

- 3 a. Describe the three main categories of constraints on database. Explain with example. (08 Marks)
- b. Briefly describe the steps involved in ER – to relational mapping algorithm. (08 Marks)

OR

- 4 a. Describe the characteristics of Relations with examples. (08 Marks)
- b. Consider the following COMPANY relational schema as shown below :  
 EMPLOYEE (Ename, SSn , Sex, Salary , Super\_SSn , Dno)  
 DEPARTMETN (Dname , Dnumber , Mgr\_SSn)  
 DEPT\_LOCATIONS (Dnumber, Dlocations)  
 PROJECT (Pname, Pnumber, Plocations,Dnum)  
 WORKS\_ON (ESSn, Pno, Hours)  
 DEPEDENT (ESSn , Dependent\_name, Sex, Relationship)  
 Give expression in relational algebra for each of the following queries.
  - i) Make a list of project numbers for project that involve an employee whose last name is "Smith", either as a worker or as a manager of the department that controls the project.
  - ii) Find the names of employees who work on all the projects controlled by department number 5.
  - iii) Retrieve the names of employees who have no dependents.
  - iv) List the names of managers who have atleast one dependent. (08 Marks)

### Module-3

- 5 a. Consider the COMPANY relation schema given in Q.No. 4(b). give an expression in SQL for each of the following queries :
  - i) Retrieve the department name and number located in every locations in which 'Research' department is located.
  - ii) For each department that has more than five employees, retrieve the department number and number of employees who are making more than Rs 27000.
  - iii) List the names of Managers who have atleast one dependent.
  - iv) Retrieve the names of each employee who has a dependent with the same first name and same sex as the employees. (08 Marks)
- b. Describe how constraints can be specified as Assertions and Actions as Triggers in SQL. (08 Marks)

OR

- 6 a. Explain the impedance mismatch between host language and SQL and describe how cursors address this. (08 Marks)
- b. Why are stored procedures important? How do we declare stored procedure and how are they called from application code? (08 Marks)

**Module-4**

- 7 a. Explain Second and Third normal forms with examples. How BCNF is stronger than 3NF? Explain. (08 Marks)
- b. Write the algorithm for finding a key K for R given a set of functional dependencies F. Consider R(A, B, C, D, E) with a set of FD's  $A \rightarrow BC$ ,  $BC \rightarrow AD$ ,  $D \rightarrow E$ . Find key for R and state its highest normal form. Give Reasons. (08 Marks)

OR

- 8 a. Explain informal design guidelines for relation schema. Give example. (08 Marks)
- b. Let  $R = \{SSn, Ename, Pnumber, Pname, Plocation, Hours\}$  and  $D = \{R_1, R_2, R_3\}$ . Where  $R_1 = EMP = \{SSn, Ename\}$ ,  $R_2 = PROJ = \{Pnumber, Pname, Plocation\}$ ,  $R_3 = WORKS\_ON = \{SSn, Pnumber, Hours\}$ . The following functional dependencies hold on R  
 $F = \{SSn \rightarrow Ename, Pnumber \rightarrow \{Pname, Plocation\}, \{SSn, Pnumber\} \rightarrow Hours\}$ .  
 Prove that the above decomposition of relation R has lossless join property. (08 Marks)

**Module-5**

- 9 a. Explain the problems that occur when concurrent execution is uncontrolled. Give example. (08 Marks)
- b. Describe transaction support in SQL. Give example. (08 Marks)

OR

- 10 a. Describe the problems of deadlock and starvation and the different approaches to dealing with these problems. Explain with example. (08 Marks)
- b. Discuss the immediate update recovery techniques in both single – user and multiuser environments. What are the advantages and disadvantages of this recovery techniques? (08 Marks)

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