

CBCS SCHEME

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15CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022

ACHARYA INSTITUTE OF TECHNOLOGY
Bangalore - 560075

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)

DEPARTMENT (Dname, Dnumber, Mgr_SSn)

DEPT_LOCATIONS (Dnumber, Dlocations)

PROJECT (Pname, Pnumber, Plocations, Dnum)

WORKS_ON (ESSn, Pno, Hours)

DEPENDENT (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)
