VIT UNIVERSITY
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VELLORE ■ CHENNAI
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Term End Examination - November 2014

Course : ITE302 - Database Systems **Slot : D2**

Class NBR : 1588 / 1591

Time : Three Hours **Max.Marks:100**

PART – A (8 X 5 = 40 Marks)
Answer ALL Questions

1. Discuss the various types of database system users.
2. Compare and contrast the advantages of database systems with respect to file systems.
3. How do different schema languages support the architecture? What kind of architecture is followed in order to support the present DBMS requirements? Explain each level with an example.
4. Brief the constraints used in ER modeling
5. What causes a transaction to fail? Draw the state transition diagram illustrating the states for transaction execution.
6. Write the various forms of ALTER command.
7. Illustrate a two level primary key index for the relation given below.

   Student(regno, name, CGPA, address). Consider atleast 15 records in the relation.
8. What are update anomalies?

PART – B (6 X 10 = 60 Marks)
Answer any SIX Questions

9. Explain in detail the components of Database Management System
10. Notown Records has decided to store information about musicians who perform on its albums (as well as other company data) in a database. The company has wisely chosen to hire you as a database designer (at your usual consulting fee of $2,500/day).
    - Each musician that records at Notown has an SSN, a name, an address, and a phone number. Poorly paid musicians often share the same address, and no address has more than one phone.
    - Each instrument that is used in songs recorded at Notown has a name (e.g., guitar, synthesizer, flute) and a musical key (e.g., C, B-flat, E-flat).
    - Each album that is recorded on the Notown label has a title, a copyright date, a format (e.g., CD or MC), and an album identifier.
    - Each song recorded at Notown has a title and an author.

- Each musician may play several instruments, and a given instrument may be played by several musicians.
- Each album has a number of songs on it, but no song may appear on more than one album.
- Each song is performed by one or more musicians, and a musician may perform a number of songs.
- Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.

Design a conceptual schema for Notown and draw an ER diagram for your schema.

11. Consider the following database.

Employee (First Name, Mid Name, Last Name, SSN Number, Birthday, Address, Sex, Salary, Supervisor SSN, Department Number)

Department (Department Name, Department Number, ManagerSSN, ManageStartDate)

Project (Project Name, Project Number, Project Location, Department Number)

Write SQL query for the following,

a. Create table department. Set Department number as primary key, department name as not null, manager ssn refers to supervisor ssn of employee table and when this manager ssn is deleted then it need to be set as null and when it is updated the change should be in effect in employee table too. **[3]**

b. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date. **[2]**

c. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor. **[2.5]**

d. Make a list of all project numbers for projects that involve an employee whose last name is 'Smith' as a manager of the department that controls the project. **[2.5]**

12. (a) Consider the relation R (M,Y,P,MP,C) and the FD{ M → MP; (M,Y) →P,MP → C}. **[5]**
Is this decomposition D= {d1 (M, Y, P) , d2 (M, MP, C)} lossless? Show why.

(b) Given the relation $R = (A, B, C, D, E)$ and set of functional dependencies **[5]**
$F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$. Check whether the relation satisfies 3NF.

13. Specify the following queries in relational algebra. Consider the relations,

Emp(SSN, Name, MGR_SSN, Salary, Dno, PhoneNo)

Works_on(SSN, ProjNo,Hours)

a. To retrieve all employees supervised by Borg. i.e direct subordinates of Borg and employees supervised by Borg's subordinates. **[3]**

b. To retrieve each department number, the number of employees in the department and their average salary and rename the resulting attributes. **[2]**

c. To retrieve the names of employees who work on all projects that ‘Tej’ works on. **[4]**

d. To retrieve the Name, salary of employees who work in department number ‘5’. **[1]**

14. Explain how ARIES algorithm works in database recovery.

15. Justify with example why concurrency control is needed using the different problems that would arise when concurrency control is not used?

16. Explain in detail with illustration about the Primary index, Secondary index and Clustered index.

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