Code: CS33   **Subject: DATABASE MANAGEMENT SYSTEMS**

ALCCS – (OLD SCHEME)

Time: 3 Hours | **FEBRUARY 2012** | **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:
- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

Q.1

    a. Explain the three level schema architecture of DBMS.

    b. Mention the differences between ROLAP and MOLAP.

    c. Differentiate between relationship instance, relationship type and relationship set?

    d. Verify the statement "A relation in 4NF is also in BCNF".

    e. The projection operation of the relational algebra is called Redundancy Elimination Operation? Why?

    f. Prove that any relation schema with two attributes is in BCNF.

    g. Differentiate between strict and conservative two phase locking protocol.   **(7 × 4)**

Q.2   For the following problem definition:
- The university keeps track of each student's name, student number, social security number, current address and phone, permanent address and phone, birthdate, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and zip of the student's permanent address, and to the student's last name. Both social security number and student number have unique values for each student.
- Each department is described by a name, department code, office number, office phone, and college. Both name and code have unique values for each department.
- Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of course number is unique for each course.
- Each section has an instructor, semester, year, course, and section number. The section number distinguishes different sections of the same course that

are taught during the same semester/year; its values are 1, 2, 3, ...; up to the number of sections taught during each semester.

- A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, 4).

(i) Draw an E-R diagram.   **(9)**

(ii) Map E-R diagram to Relational Model.   **(9)**

Q.3 a. How are primary key and foreign key constraints enforced in DBMS? Is the enforcement technique difficult to implement? Can the constraint checks be executed in an efficient manner when updates are applied to the database?   **(6)**

b. Consider the following tables
Works (Pname, Cname, Salary)
Lives (Pname, Street, City)
Locatedin (Cname, City)
Manager (Pname, Mgrname)
Where Pname = Person name, Cname = Company name, Mgrname = Manager name

Write the SQL for the following:
(i) List the names of the people who work for company Wipro along with the cities they live in.
(ii)List the names of the people, along with the streets and city addresses, who work for the company "Infosys" with salary more than Rs. 50000/-.
(iii)List the names of the persons who live and work in the same city.
(iv)List the names of the person who do not work for "Infosys".
(v)List the persons whose salaries are more than that of all of the 'Oracle' employee.
(vi)List the names of the companies that are located in every city where the company 'Infosys' is located   **(12)**

Q.4 a. Consider a relation R = {CourseNo, SecNo, OfferingDept, CreditHours, CourseLevel, InstructorSSN, Semester, Year, DaysHours, RoomNo, NoofStudents}. With the set of functional dependencies F = { {CourseNo} -> {OfferingDept, CreditHours, CourseLevel}, {CourseNo, SecNo, Semester, Year} -> {DaysHours, RoomNo, NoOfStudents, InstructorSSN},{RoomNo, DaysHours, Semester, Year} -> {InstructorSSN, CourseNo, SecNo}}
Determine the candidate keys of R. Normalize R into BCNF relations. Compute canonical cover of F.   **(12)**

b. State BCNF and 4NF. Explain why 4NF is more desirable than BCNF.   **(6)**

Q.5 a. Discuss the different states of a transaction. Discuss the ACID properties of transactions. Why concurrency control mechanism is needed? What are the problems which occur when the transactions are executed concurrently?   **(9)**

b. Discuss the Deffered and Immediate log based recovery scheme. What is the purpose of check point in these schemes? **(9)**

Q.6   a. Discuss the steps involved in knowledge discovery in databases? **(6)**

b. Explain fragmentation transparency, replication transparency, and location transparency in the context of distributed databases. **(6)**

c. Explain the difference between star schema, snowflake schema and fact constellations. **(6)**

Q.7   Write Short notes on any **THREE** of the following:-

       (i)   Join Dependency and 5NF.
       (ii)   Database security.
       (iii) Granularity of data items.
       (iv) Conflict serializability of schedules.   **(6+6+6)**