NATIONAL INSTITUTE OF TECHNOLOGY CALICUT
DEPARTMENT OF COMPUTER SCIENECE &ENGINEEERING
CS6113E TOPICS IN DATABASE DESIGN
MIDSEM
February 12, 2025
Part B

Time: 90 minutes

Max. Marks: 15

Answer All Questions

Q1. For the following Functional Dependencies give the equivalent Template Dependencies.

    (a) Book (BookID, Title,Author, Category) FD: BookID→(Title, Author, Category)
    (b) Student(Studentid,Name,Deptid); Dept(Deptid,Dept);
        FD: Student.Deptid→Dept.Deptid.   (3 marks)

Q2.

    a. There is a business rule in a university that "A student must pass a course (Grade should not be 'F') in order to register for another course". Represent this condition using DKNF assuming suitable schema for the tables and also suitable list of letter grades.

    b. In a company there is a business rule that "If an employee is assigned a 'Night' shift, a supervisor must be assigned". Represent this condition using DKNF, assuming suitable schema for the tables.   (2 * 2= 4 marks)

Q3.

    a. Consider the following Database tables
        Course(Courseid, Coursename,Mingrade) , Student(Studentid,Name, Courseid, Grade)
        Constraint: A student must have a grade greater than or equal to the minimum required grade for the course. Express this constraint using TD and an equivalent FD.

    b. A student who has the highest CGPA in a course is eligible for a gold medal of the university. Express this dependency using FD and TD.
        Assume the tables as: Student(Student, Name, Course, CGPA); Goldmedalist(Course, Studentid,CGPA)

    c. The Govt. Plans to provide scholarship to selected candidates being Single Girl Child for pursuing Post-graduation on full time/regular basis in Universities/Institutes/Colleges in India. Express this condition using TD and FD. Assume suitable tables for this use case.
                                      (2 *3= 6 marks)

Q4.

    a. Illustrate the difference between Natural Join, Equi Join and Theta Join with one example each.
    b. In which contexts, the Ourter Joins are useful while handling user queries?
                                        (1.5 +0.5=2 marks)

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NATIONAL INSTITUTE OF TECHNOLOGY CALICUT
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CS6113E TOPICS IN DATABASE DESIGN
ENDSEM
April 28, 2025
Part B

Time: 110 minutes   Max. Marks: 25

Answer All Questions

Q1. [CO1]

Consider the following relational databases.
Emp(Empno, Ename, Job(designation), MGR(Manager id), Job(Job title), Hiredate,
Sal, Comm(Commission), DNo(Department Number))
Dept (Deptno, Dname, Loc, HoDid)
Write **queries in both SQL and QBE** for the following:

(i)   Find the names and salaries of all employees who work as 'Associate Professor' and earn more than 2 Lakhs per month.

(ii)   Find the names of the departments that are located in the same city as another department.

(iii)   Find the names of employees and the names of their departments where the department is located in 'Calicut'.

(iv)   Find the names of all employees who work in the same department as their managers. List their names along with the manager's name and the department number.

(v)   Find the names of all employees whose salary is higher than the average salary of their department (considering both employees and their managers in the department).   (7.5 marks)

Q2. [CO2]

Comment on the following SQL queries (state why they are costlier) and give equivalent Optimized SQL queries. Structure of the Salary table may be taken as Salary(Empno, Sal, Bonus, commission).

(i)   ELECT ENAME, SAL FROM EMP WHERE SAL > (SELECT AVG(SAL) FROM EMP);

(ii)   SELECT DISTINCT DEPTNO FROM EMP;

(iii)   SELECT E.ENAME, E.SAL, (SELECT AVG(SAL) FROM EMP) AS AVG_SAL FROM EMP E;

(iv)   SELECT E.ENAME, D.DNAME, M.ENAME AS MANAGER, S.SALARY FROM EMP E, DEPT D, EMP M, SALARY S;

(v)   SELECT DEPTNO, AVG(SAL) FROM EMP
         GROUP BY DEPTNO WHERE AVG(SAL) > 10000;   (7.5 marks)

Write clear, brief and precise answers. Avoid overwriting.