



School of Computer Science Engineering and Information Systems

Winter Semester 2023-2024

Continuous Assessment Test – II

Programme Name & Branch B.Tech(IT)

Course Name & code: Database Systems & BITE302L

Class Number (s): 3806, 3943, 4033, 3802

**Faculty Name (s) Dr. Bimal Kumar Ray, Dr. Muthamil Selvan T, Dr. Senthilkumar N C,
Dr. Karthikeyan J**

Exam Duration: 90 Min.

Maximum Marks: 50

1. Consider the following relational database schema wherein the primary keys are underlined and the foreign keys are self-explanatory.

STUDENT (regno, name, major, DOB)

ENROLL (regno, courseno, grade)

BOOK_ADOPT (courseno, book ISBN)

TEXT (book ISBN, title, publisher, author)

Write a relational algebra expression for the following: **(2 + 2 + 2 + 4 Marks)**

- Find the courseno in which all IT major students have registered.
- Produce a listing of textbooks for courses that have more than two books.
- Retrieve the courseno that follow books published by Pearson education.
- Find the books (title) that a student named 'X' should purchase.

2. Employee (Eno, name, dept_id, dob, date_of_joining, salary)

Dept (dept_code, dept_name, manager)

Dependent (eno, depend_name, age, native)

Write down and explain the schema-based constraints and one semantic constraint that hold on above schema.

3. Consider the universal relation $UR = \{Q, R, S, T, U, V, W, X, Y, Z\}$ and the set of functional dependencies $F = \{\{Q\} \rightarrow \{Y\}, \{X\} \rightarrow \{Z\}, \{Q, R\} \rightarrow \{S\}, \{Q, T\} \rightarrow \{W, X\}, \{R, T\} \rightarrow \{U, V\}\}$. Find out the primary key of the relation UR. Normalize the relation UR up to BCNF.

4. Consider the universal relation $UR = \{Q, R, S, T, U, V, W, X, Y, Z\}$ and the set of functional dependencies $F = \{\{Q, R\} \rightarrow \{S\}, \{Q\} \rightarrow \{T, U\}, \{R\} \rightarrow \{V\}, \{V\} \rightarrow \{W, X\}, \{T\} \rightarrow \{Y, Z\}\}$.

Determine whether each decomposition has (1) the dependency preservation property, and (2) the lossless join property, with respect to F .

a. $D1 = \{UR1, UR2, UR3, UR4, UR5\}$; $UR1 = \{Q, R, S\}$, $UR2 = \{Q, T, U\}$, $UR3 = \{R, V\}$, $UR4 = \{V, W, X\}$, $UR5 = \{T, Y, Z\}$

b. $D2 = \{UR1, UR2, UR3\}$; $UR1 = \{Q, R, S, T, U\}$, $UR2 = \{R, V, W, X\}$, $UR3 = \{T, Y, Z\}$

5. Consider the following relational database schema wherein the primary keys are underlined and the foreign keys are self-explanatory.

Patient(code, name, address, doctor_id)

Doctor(doctor_id, name, department_name)

Admit(ward_no, patient_code, bed_no, attending_doctor_id)

Write SQL queries for the following:

(3 + 3 + 2 + 2 Marks)

- Using Join, find the patient name, doctor name, admitted wardno, bedno for a given patient code.
- Write a sub-query to find the cardiologist's name who attend patients coming from Vellore and admitted in ward no 5.
- List the number of doctors department wise.
- Display the doctor's name who does not have patients.