University of Jaffna, Sri Lanka

Bachelor of Science Degree Examination in Computer Science, Level-2S, 2017

ICA 02 - CSC2012S2

Time allowed: 1 Hour *Date: 04 November 2019*

1. (a) State clearly what is meant by *normalisation* and its importance in designing a database.

   (b) Define *first*, *second* and *third normal forms*.

   (c) A sample details of *patient dental appointments* is given below.

Staff No	Dentist Name	Patient No	Patient Name	Appointment Date	Appointment Time	Surgery No
S1011	Smith	P100	Gillian	12-Aug-18	10.00	S10
S1011	Smith	P105	Bell	13-Aug-18	12.00	S15
S1024	Pearson	P108	Mackay	12-Sep-18	10.00	S10
S1024	Pearson	P108	Mackay	14-Sep-18	10.00	S10
S1032	Robinson	P105	Bell	14-Oct-18	16.30	S15
S1032	Robinson	P110	John	15-Oct-18	18.00	S13

   (d) The table above shown is susceptible to update anomalies. Provide examples of *insertion*, *deletion*, and *update* anomalies.

   (e) Describe the process of normalising the above table into tables of third normal form. State clearly any assumptions you make.

2. Consider the following *relational schema* which is intended to represent the Books of a multi- branch library.

   - `Branch` (BranchNo, Librarian, Address)
   - `BookItem`(BranchNo, Title, No.OfCopies)
   - `Titles` (Title, Author, Publisher)

   Write *relational algebra* statements to retrieve details of each of the following:

   (a) The names of the authors whose names begin with the letter `A`.

   (b) The titles of the books published by `Macmillan`.

   (c) Branches that hold any books written by `Ann Brown`.

   (d) Branches which have no books written by `Ann Brown`.

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Bachelor of Science Degree Examination in Computer Science, Level-2S, 2017

ICA 01 – CSC201S2

Time allowed: 1 Hour **Date: 19 August 2019**

1. Describe what is meant by data model in the context of Database.
2. List two actors and state their responsibilities of a Database Management System (DBMS).
3. Describe the following kinds of relations using suitable examples:
   a. One-to-one relation.
   b. One-to-many relation.
   c. Many-to-one relation.
   d. Many-to-many relation.
4. The Company database keeps track of a company's Employees, Departments and Projects. The following are the requirements and specifications.
   - The company is organized into departments. Each department has a unique name, unique number, particular employee who manages the department.
   - We keep track of the start date when that employee began managing the department.
   - A department may have several locations. A department controls a number of projects, each of which has a unique name, unique number, and single location.
   - We store each employee's name, social security number, address, salary, sex and birth date. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same department.
   - We keep track of the number of hours per week that an employee works on each project. We keep track of the direct supervisor of each employee.
   - We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's first name, sex, birth date, and relationship to the employee

   a. Identify and list the entities and attributes of each entity. Specify the primary key, candidate key and foreign keys of each entity.
   b. Design an ER diagram for the **Company** database.