

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING
ECI4166 – DATA MODELING AND DATABASE SYSTEMS
FINAL EXAMINATION - 2009



CLOSED BOOK TEST

Date: May 19, 2010

Time: 0930– 1230 hrs

Answer all questions.

Q1.)

I.) List 2 advantages of using ER diagrams in database modeling.

(Marks 02)

II.) List 3 types of relations widely used in ER diagrams.

(Marks 03)

III.) Suppose a hospital requires an information system to facilitate requirements given below. You are to design an E-R diagram to represent the given scenario. Specify primary keys, foreign keys and cardinalities in your diagram.

(Marks 20)

In each ward of the hospital, patients are treated by the doctors assigned to them. Usually each patient will be assigned a single doctor, but in rare cases they will have two. Physicians also attend to the patients.

The system is to be concerned solely on the prescribed drugs. Each patient is prescribed to take drugs a certain number of times per day for number of days.

The system must record details concerning patient treatments and staff payments. In-house staff is paid monthly salaries and the visiting staff is paid on part-time basis. Doctors and physicians work overtime at varying rates based on their job grades.

The system is expected to record the treatments for each patient, for their stay in the hospital. Also, it should be capable of calculating the fee for a doctor and a physician per week.

IV.) Design a Relational database based on the E-R diagram developed in (III.). In your E-R diagram clearly show the primary keys and the foreign keys.

(Marks 15)

V.) Clearly state the assumptions you made during the design of the E-R diagram.

(Marks 05)

Q2.)

I.) Explain why Normalization is important in database design.

(Marks 04)

II.) Define first, second, third normal forms of a relation.

(Marks 06)

III.) Define the term functional dependency of Relation schema R. Describe how to determine functional dependencies that holds on Relation schema R?

(Marks 05)

IV.) Consider the following relational schema R, which has attributes that holds information on employees, department and project.

$R = \{Project_No, Project_Name, Employee_No, Employee_Name, Job_Class, Hourly_Rate, Department_No, Department_Name\}$

Suppose following functional dependencies hold on R.

$\{Project_No, Employee_No, Department_No\} \rightarrow \{Project_Name, Employee_Name, Job_Class, Hourly_Rate, Department_Name\}$

$Project_No \rightarrow Project_Name$

$Employee_No \rightarrow Employee_Name, Job_Class, Hourly_Rate$

$Department_No \rightarrow Department_Name$

a.) Find the keys of R

(Marks 5)

b.) Decompose R into set of Third Normal relations.

(Marks 10)

Q3.)

I.) List the definitions for the terms data warehouse, repository, operational data store, data mart, and metadata

(Marks 05)

II.) What would below businesses use for their information need? State the criteria you used to make your decision.

D - Data warehouse

M - Data mart

O - Operational data store

R - Repository

a.) After a merger of several banks, tellers need to obtain the balances of customer accounts at any of the newly acquired banks.

(Marks 05)

b.) A fast food chain wants to compare the daily sales of their products by district and region.

(Marks 05)

c.) The sales division of a farm equipment manufacturer needs to track the revenue of all new dealers for their first year of operation.

(Marks 05)

d.) The marketing division of a home products company wants to analyze the buying patterns of their customers to target those most likely to buy.

(Marks 05)