National University of Computer and Emerging Sciences, Lahore
Fall Semester 2012

Course: CS204- DATABASE SYSTEMS Time Allowed: *90 min.*

Max Points: *45*

Midterm 2

Section: _____ Name: _____ Roll No: _____

Question 1 (10 points)

Consider the relation R(V, W, X, Y, Z) with FDs {Z → Y, Y → Z,X → Y,X → V, VW → X}.

a) List the possible keys for relation R based on the FDs above.

b) Show the closure for attribute X given the FDs above.

c) Suppose that relation R is decomposed into two relations, R1(V, W, X) and R2(X, Y, Z). Is this decomposition a lossless decomposition? Explain your answer.

Question 2 (5 points)

Given relation R(W, X, Y, Z) and set of FDs F = {X → W, WZ → XY, Y → WXZ}. Compute the minimal cover for F.

Question 3 (5 points)

Given relation R(W, X, Y, Z) with set of FDs F = {Z → W, Y → XZ, XW → Y }. The possible keys are {Y}, {X,Z}, {W,X}. Identify the best normal form that R satisfies (1NF, 2NF, or 3NF). Justify your answer. If the relation is not in 3NF, decompose it until it becomes 3NF.

Question 4 (15 points)

You have to design an EER model for an online bookstore. The bookstore consists of books and magazines. Each book is described by a unique ISBN number, a title, its author(s), its publisher, price and year of publication. Each (issue of) magazine is described by a unique name, date of publication, its publisher, price and name of the editor-in-chief. The bookstore stock items in a warehouse and records the warehouse address, phone and unique code. It also records the number of particular item present in a warehouse.

Bookstore keeps track of its customer and for each customer it maintains customer's name, a phone, an address, and unique email. The customer can add bookstore items to a shopping basket and each basket has unique id. Recently, the bookstore adds music cassettes and compact disks to its collection. The same music item may be present in cassette or compact disk format, with differing prices. A shopping basket may contain any combination of books, magazines, music cassettes, or compact disks.

Question 5 (10 points)

Map the EER diagram given below, to relational schema. Clearly specify all the primary keys, foreign keys, and other constraints.