COMP 314: DATABASE MANAGEMENT SYSTEMS

DAY: WEDNESDAY DATE: 17/04/2013

TIME: 9.00 – 11.00 A.M. STREAM: Y3S1

INSTRUCTIONS:

- There are **4 questions** in this paper. Answer **Question 1** – Compulsory, and Any Other **Two** Questions

Question 1 (30 Marks) –Compulsory Question

a) Define the following terms: **(4 marks)**
   (i) Trigger (ii)View (iii)Database schema (iv)Meta-data

b) With the aid of diagrams, differentiate between file-based approach and database approach. (**2 Marks**)

c) The database is the underlying framework of an information system; what is an information system? Name one type of an information system. (**2 Marks**)

d) Differentiate between the following types of business information: tactical information and operational information. In addition, mention what category of people in an organization, would need these types of business information. (**4 Marks**)

e) Give two functions of a database management system. **(2 marks)**

f) Draw a diagram to show the database system architecture. Briefly explain the various parts of the architecture and also explain the following: - Logical data independence and physical data independence. **(6 marks)**

g) The values of each attribute are defined in terms of three properties; which are these properties? Explain each one briefly. **(3 marks)**

h) Create an E-R diagram for each of the following pairs of enterprise rules between the entities **Lecturer** and **Course**. Indicate the type of relationship suggested between the entities. **(3 marks)**

a. 'A lecturer teaches, at most, one course'
   'A course is taught by, at most, one lecturer'
b. 'A lecturer may teach many courses.'
   'A course is taught by, at most, one lecturer.'
c. 'A lecturer may teach many courses.'
   'A course may be taught by many lecturers.'

i) Name four major components of a dbms. Briefly describe each. **(4 marks)**

Question 2 (20 Marks)

a) Describe the following concepts: **(4 marks)**

(i) Degree of a relationship.
(ii) Functional dependency.
(iii) Determinant.
(iv) Embedded SQL

b) Discuss the following integrity constraints: entity integrity constraint, referential integrity constraint, and enterprise rules. **(3 marks)**

c) What are the main phases of database design process? Briefly describe each phase. **(6 marks)**

d) Describe a composite attribute. Give an example. **(2 marks)**

e) The Customer-Part table below shows the quantities in which customers have ordered parts.

Customer#	Customer_Name	Part#	Part_Desc	Quantity
C4	Carter	P7	Pin	5
C4	Carter	P2	Nut	100
C2	Carter	P2	Nut	200
C8	Brown	P4	Nut	5

(i) Identify redundant duplication of data values. Explain why. **(1 mark)**
(ii) Identify non-redundant duplication of data values. Explain why. **(1 mark)**
(iii) Show how redundancy can be eliminated from the above table by decomposing the table into three. **(3 marks)**

Question 3 (20 Marks)

a) A normalised relation is a relation that satisfies the properties of a relation. Give three properties of a relation. **(3 marks)**

b) Explain the term impedance mismatch in the context of embedding SQL commands in a host language such as C/Java. **(3 Marks)**

c) Give any two functions of a database application **(2 Marks)**

d) What are the two ways in which SQL can be used? How do application developers benefit from these two ways **(3 Marks)**

e) Write the basic form of an SQL query and briefly explain the different parts in it. **(3 Marks)**

f) Consider the **Modules** and **Lecturers** database tables below. **(6 Marks)**

Module

ModuleName	Level	CourseCode	StaffNo
Relational Database Systems	1	CSD	234
Relational Database Design	1	CSD	234
Deductive Databases	3	CSD	345
Object-Oriented Databases	3	CSD	345
Distributed Database Systems	2	CSD	237
Intro to Business	1	BSD	123
Basic Accountancy	1	BSD	145

Lecturers

StaffNo	StaffName	Status	DeptName	Salary
234	Davies T	L	Computer Studies	20000.00
237	Patel S	SL	Computer Studies	27500.00
345	Evans R	PL	Computer Studies	35500.00
123	Smith J	L	Business Studies	20000.00
145	Konstantinou P	SL	Business Studies	27500.00

Use the data in the tables above to write the SQL statements to display or modify data as indicated in the questions below:

(i) Show all the modules whose names end with S.
(ii) Show the names of all lecturers who earn more than 25000.00 and less than 35000.00.
(iii) Show the highest paid salary.
(iv) Compute the number of modules taught by each lecturer.
(v) Add a new module to the Module relation whose details are: ModuleName: *Operating Systems*. Level: *2*. CourseCode: *CSD*. StaffNo: *237*.
(vi) Remove the module *Intro to Business*.

Question 4 (20 Marks)

a) Explain two of the responsibilities of the database administrator in managing the database environment? **(2 Marks)**

b) Name the problems caused by data redundancy which is addressed by normalization. (**2 Marks**)

c) Explain in detail two of the properties that each transaction in a database system should demonstrate. **(2 Marks)**

d) What is meant by the concurrent execution of database transactions in a multi-user system? **(2 Marks)**

e) What is a data warehouse? Give one of its main characteristics? (**2 Marks**)

f) Describe how the fact tables and dimension tables of a star schema differs. (**2 Marks**)

g) Name the four main operations in data mining. (**2 Marks**)

h) Use the example report below to show the process of normalization up to 3NF. Explain what is involved on each step of the process **(6 Marks)**

Page *1* | ***DreamHome*** Property Inspection Report | Date *1-Oct-98*

Property Number *PG4* | Property Address *6 Lawrence St, Glasgow*

Inspection Date	Inspection Time	Comments	Staff Number	Staff Name	Car Reg
18-Oct-96	10.00	Need to replace crockery	SG37	Ann Beech	M231 JGR
22-Apr-97	09.00	In good order	SG14	David Ford	M533 HDR
1-Oct-98	12.00	Damp rot in bathroom	SG14	David Ford	N721 HFR