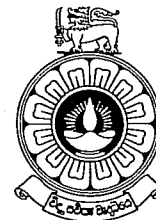


THE OPEN UNIVERSITY OF SRI LANKA
 DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
 B.Sc. DEGREE PROGRAMME: LEVEL 05
 FINAL EXAMINATION: 2012/2013
 CSU3278: DATABASE MANAGEMENT SYSTEMS



DURATION: THREE HOURS (3 HOURS)

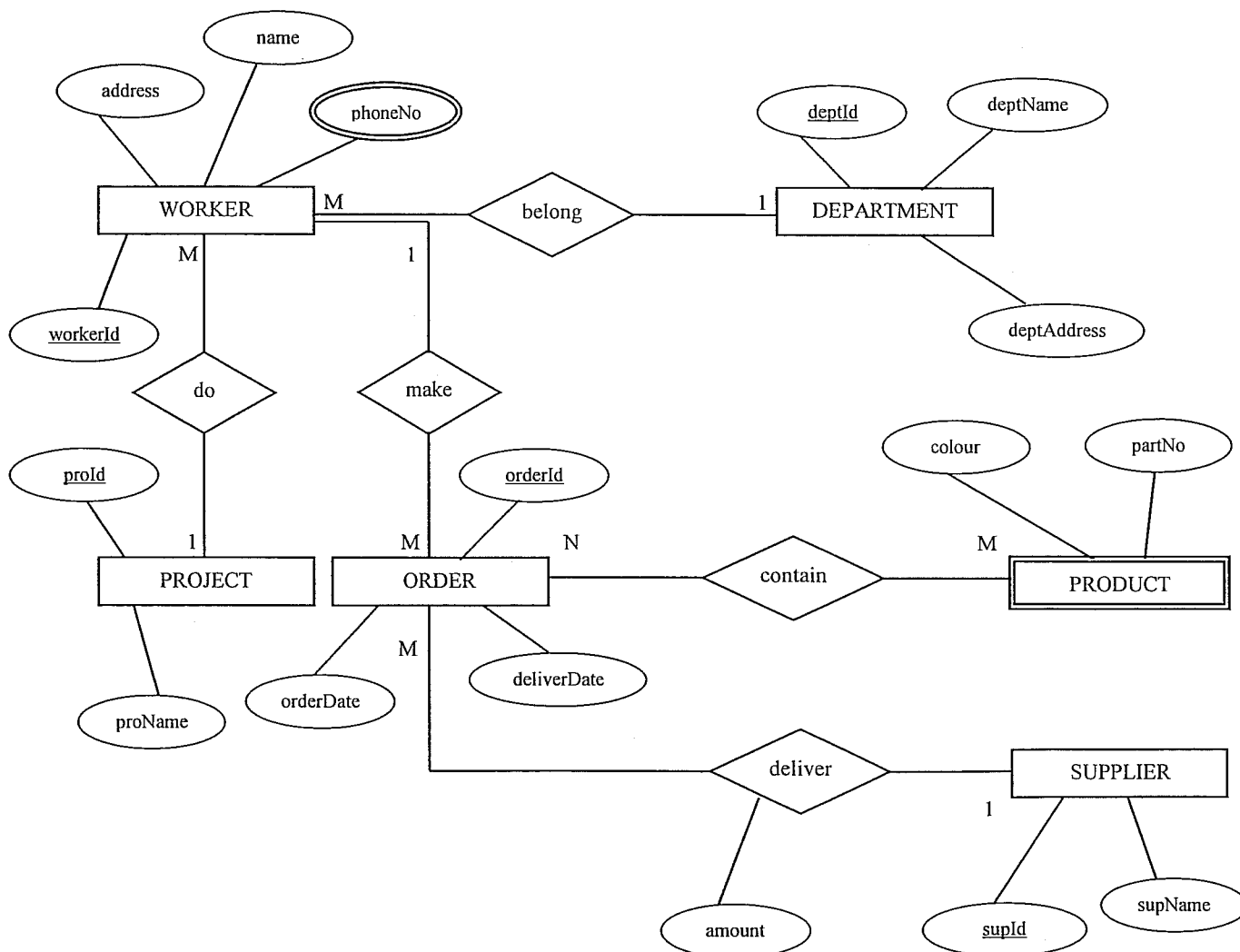
Date: 28th November 2013

Time: 9.30 am – 12.30 pm

Answer FOUR (04) questions ONLY.

QUESTION 01

Map the given Entity Relationship Diagram (ERD) into a relational schema and specify all primary keys and foreign keys.



QUESTION 02

- a) Explain the difference between *Data* and *Information* giving suitable examples.
- b) What are *redundant data*? What will happen to a database if it contains redundant data?
- c) Why would you choose a database system instead of a manual file system?
- d) What are the responsibilities of a *DBA (Database Administrator)* ?
- e) Define the term *Production DBMS*.
- f) How is the *Data Dictionary* used in DBMS?
- g) What is the difference between *Conceptual Model* and *Implementation Model*?
- h) By means of examples, briefly describe the following.
 - i. Database
 - ii. One to one relationship
 - iii. Unary relationship
 - iv. Tuple
 - v. Foreign key

QUESTION 03

- a) Define the following terms giving an example for each.
 - i. Strong entity
 - ii. Weak Entity
 - iii. Composite attribute
 - iv. Derived attribute

- b) The following description explains a database of an Exercise Machine Manufacturing Factory.

An Exercise Machine manufacturer buys components of exercise machines from suppliers and assembles different models of exercise machines. These machines are then sold to distributors. Manufacturer records the supplier no, name and address of the supplier and distributor code,name and address of the distributor. Exercise machines are identified by the model no. Any given component is supplied by at least two different suppliers. A component is uniquely identified by the component code. Each component can be used in the assembly of several different models of exercise machines. An exercise machine is made up of many different types of components. A good distributor can resell many different models of exercise machines. For each model of exercise machines, the retail price, selling price by the distributor and for each component, its selling price by the supplier are also needed to be recorded. Each supplier and distributor record their names, addresses and particular selling prices. Supplier and distributor are uniquely identified by the supplier id and distributor id.

Identifying all the entities, attributes and primary keys, draw an Entity Relationship Diagram (ERD) to represent the above database.

QUESTION 04

- a) Briefly explain the following terms with suitable examples.
- i. Fully Functional Dependency
 - ii. Partial Functional Dependency
 - iii. Transitive Functional Dependency

- b) In what Normal Form, the following relational schema is in? Explain.

GRADE (A, B, C, D, E, F, G)

You are given the following functional dependencies.

A, B \longrightarrow C, D, E

C \longrightarrow D

D \longrightarrow G

E \longrightarrow F

Note: Attribute A, B act as the primary key.

- c) What will happen if you add another functional dependency A \longrightarrow D?

QUESTION 05

- a) Give brief description for the following terms.
- i. First Normal Form (1NF)
 - ii. Second Normal Form (2NF)
 - iii. Third Normal Form (3NF)

- b) Define Boyce-Codd Normal Form (BCNF). How does it differ from 3NF?

- c) Consider the following relation:

CAR_SALE (carNo, salesmanNo, dateSold, commission, discountAmt)

Assume that a car may be sold by multiple salesmen and hence (carNo, salesmanNo) is the primary key. Additional dependencies are:

dateSold \longrightarrow discountAmt

salesmanNo \longrightarrow commission

- i. Based on the given primary key, is this relation in 1NF, 2NF, 3NF or BCNF? Explain.
- ii. How would you successively normalize it completely?

QUESTION 06

The following relational schema illustrates the student database maintained by the Department of Mathematics and Computer Science, the Open University of Sri Lanka.

STUDENT (**stuNumber**, stuName, majorSubject, stuLevel, stuAge, coordinatorId)

DAY_SCHOOL (**courseCode**, **dsDate**, dsTime, dsVenue, coordinatorId)

ENROLLED (**stuNumber**, **courseCode**)

COORDINATOR (**id**, name, deptId)

Write SQL statements to perform the following tasks.

- i. Create a database called **OUSL.db**.
- ii. Create tables called **STUDENT**, **DAY_SCHOOL**, **ENROLLED** and **COORDINATOR** in the database, OUSL.db.
- iii. Retrieve the names of all juniors (**stuLevel = level3**) who are enrolled in day schools coordinated by **Mr. Asanka De Silva**.
- iv. Find the age of students who are either studying **Computer Science** as the major subject or are enrolled in courses coordinated by **Mr. Asanka De Silva**.
- v. Retrieve the names of coordinators who coordinate courses which are taught at the **Auditorium**.

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