Department of Technical Education and Training - College of Technology, Ratnapura
NVQ LEVEL 05 WRITTEN EXAMINATION - Semester I - November 2010
National Diploma in Information & Communication Technology

Database Management Systems I	100 Marks	Three Hours

Instructions: Answer all questions

1.

i. What is a DBMS? (4 marks)

ii. Discuss the main characteristics of the database approach and how it differs from traditional file systems. (8 marks)

iii. What are the responsibilities of the DBA and the Database Designers? (8 marks)

2.

i. Explain the "Three Schema Architecture" of database development. (8 marks)

ii. Explain the Database Designing Process. (8 marks)

iii. Give 5 examples for Data Models. (4 marks)

3.

i. Consider the following description and draw an ER diagram for the ABC Company database. Be sure to indicate all keys and constraints and any assumption that you make. (10 marks)

- The company is organized into DEPARTMENTs. Each department has a name, number and an employee who manages the department. We keep track of the start date of the department manager.
- Each department controls a number of PROJECTs. Each project has a name, number and is located at a single location.
- We store each EMPLOYEE's social security number, address, salary, sex, and date of birth. Each employee works for one department but may work on several projects. We keep track of the number of hours per week that an employee currently works on each project. We also keep track of the direct supervisor of each employee.
- Each employee may have a number of DEPENDENTs. For each dependent, we keep track of their name, sex, date of birth, and relationship to employee.

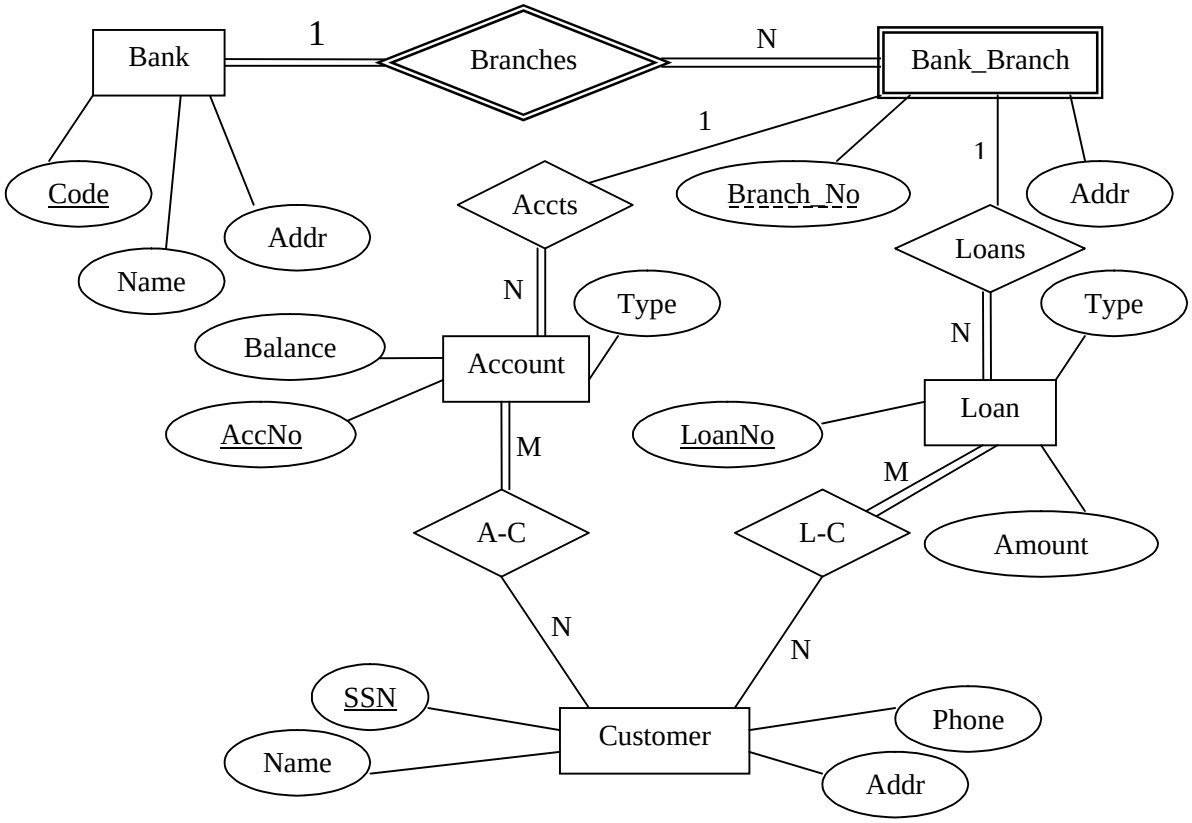
ii. Consider the ER diagram given in *Page 2* for part of a BANK database. Each bank can have multiple branches, and each branch can have multiple accounts and loans.

a) List the (non weak) entity types in the ER diagram. (2 marks)

b) Is there a weak entity type? If so, give its name, its partial key, and its identifying relationship. (2 marks)

c) What constraints do the partial key and the identifying relationship of the weak entity type specified in this diagram? (3 marks)

d) How is the Primary Key different from a Candidate Key? (3 marks)



4.

i. What is meant by "Recursive Relationship"? Give some examples of recursive. (3 marks)

ii. What is the difference between a Weak Entity and a Strong Entity set? (3 marks)

iii. Consider the relational schema given below.

Person (name,NI#,address)
Car(year,model,license)
Accident(date,driver,damage–amount)
Owns(NI#,license)
Log(license,date,driver)
Foreign key(NI#) references Person,(license) references Car
Foreign key(date,driver) references Accident,(license) references Car

Write SQL statements for the following.

a). Find the total number of people whose car was in an accident in 2009. (3 marks)
b). Find the number of accidents in which John Smith's car was involved. (3 marks)
c). Add a new customer to the database. (4 marks)
d). Delete the Volvo belonging to John Smith. (4 marks)

5. Convert each of the following schemas to 3NF; showing all intermediate stages, that is 1NF and 2NF. (10x2 marks)

i. BRANCH(Branch#,branch_add,(ISBN,Title,Author,Publisher,Num_copies))

ii. CLIENT(Client#,name,Location,Manager#,Manager_name,Manager_location, (Contract#,Estimated_cost,Completion_date,(Staff#,Staff_name,Staff_location)))