# PAPER: CASE STUDY

SPECIALITY: COMPUTER ENGINEERING OPTION: DATABASE MANAGEMENT EXAM PAPER: CASE STUDY CODE: DBM 14 CREDIT VALUE :12 DURATION :6 HOURS NATURE OF EXAM: WRITTEN

# SECTION A: Database Design (40mrks)

- 1. Define the following: (6mrks)
  - a. Database
  - b. Database design
  - c. Redundancy
- 2. Name and define the 3 problems that can be caused by Redundancy. (6mrks)
- 3. What do you understand by the ACID properties in DBMS? (6mrks)
- 4. What do the following represent in ER Diagrams?

Rectangles, Ellipses, Diamonds, Lines, Double ellipses, Dashed ellipses, Underlined attributes. (7mrks)

- 5. What is the difference between a primary key and a secondary key? (2mrks)
- 6. Give the difference between behavioral and structural diagrams (4mrks)
- 7. Draw the requested UML diagram to the following: 9mks
  - a. An automated teller machine (ATM) or the automatic banking machine (ABM) is a banking subsystem (subject) that provides bank customers with access to financial transactions in a public space without the need for a cashier, clerk, or bank teller.
    Customer (actor) uses bank ATM to Check Balances of his/her bank accounts, Deposit Funds, Withdraw Cash and/or Transfer Funds (use cases). ATM Technician provides Maintenance and Repairs. All these use cases also involve Bank actor whether it is related to customer transactions or to the ATM servicing.

Task:

DRAW THE USE CASE DIAGRAM 3mks

b. Requested order is input parameter of the activity. After order is accepted and all required information is filled in, payment is accepted and order is shipped. Note, that this business flow allows order shipment before invoice is sent or payment is confirmed. Task:

DRAW THE ACTIVITY DIAGRAM - 3mks

c. A company consists of departments. Departments are located in one or more offices. One office acts as a headquarter. Each

department has a manager who is recruited from the set of employees. Your task is to model the system for the company.

Task:

Draw a class diagram which consists of all the classes in your system their attributes and operations, relationships between the classes, multiplicity specifications, and other model elements that you find appropriate. 3mks

### SECTION B: Basic Database administration (20mrks)

- 1. What do you understand the following?
  - a. SQL (2mks)
  - b. A primary key constraint (2mks)
  - c. Normalization (2mks)
- 2. Given the demo database table "Customers" information below:

CustomerI D	CustomerNa me	ContactNa me	Address	City	PostalCod e	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	German y
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	Münche n	WA1 1DP	German y
5	Berglunds snabbköp	Christina Berglund	Berguvsväg en 8	Münche n	S-958 22	Sweden

Redraw sections of the table above to represent the following queries.

- b. SELECT CustomerName, City FROM Customers; (2mrks)
- c. SELECT \* FROM Customers WHERE Country='Mexico'; (3mrks)
- d. SELECT \* FROM Customers WHERE Country='Germany' AND City='Berlin'; (3mrks)
- e. SELECT \* FROM Customers WHERE Country='Germany' AND (City='Berlin' OR City='München'); (4mrks)

 f. INSERT INTO Customers (CustomerName, ContactName, Address, City, PostalCode, Country) VALUES ('Cardinal', 'Tom B. Erichsen', 'Skagen 21', 'Stavanger', '4006', 'Norway'); (3mrks)

### SECTION C: Database development and Human Computer interaction (25mrks)

Exercise 1: JavaScript (10marks)

- 1) Is javascript a programming language? Justify your answer. (2marks)
- 2) Write a function named subtotal that takes a s parameter a mark of a course and the coef and returns its total (total=mark \* coef) (3marks)
- 3) Assuming that the marks and the coef are stored in arrays as shown

Array 1	Subject	Subject1	Subject2	•••	Subject n
Array 2	Coef				
Array 3	marks				

Write another function (Total) that use the function subtotal to calculate the GrandTotal (GrandTotal = sum of all subtotals) (5marks)

### Exercise 2: HTML and PHP (10marks)

Write a PHP program to check whether a sequence of numbers is an arithmetic progression or not.

Hint: In mathematics, an arithmetic progression or arithmetic sequence is a sequence of numbers such that the difference between the consecutive terms is constant.

For example, the sequence 5, 7, 9, 11, 13, 15 ... is an arithmetic progression with common difference of 2. (10marks)

## **SECTION D: Networking (15 marks)**

- 1. Differentiate between half-duplex and full-duplex communication. Include examples (3 marks).
- 2. Explain the OSI model, and its importance in networking? (5 marks)
- 3. Calculate the number of hosts addresses available in a /28 subnet. (2 marks)
- 4. Explain the difference between IPv4 and IPv6. (2 marks)
- 5. Explain the difference between a file-level backup and an image-level backup in system administration. (3 marks)