

Exam.	Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Database Management System (CT 652)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.

1. Describe the different levels of abstraction in database. Discuss the significance of this abstraction. [3+1]

2. Draw an ER-diagram for the following mini-case

Each employee in an engineering company has at most one recognized skill, but a given skill may be possessed by several employees. An employee is able to operate a given machine-type (e.g., lathe, grinder) if he has one of several skills, but each skill is associated with the operation of only one machine type. Possession of a given skill (e.g., mechanic, electrician) allows an employee to maintain several machine-types, although maintenance of any given machine-type requires a specific skill (e.g., a lathe must be maintained by a mechanic).

What is a weak entity set and identifying relationship? Explain with example. [8+4]

3. Consider the following relational database model

account (account-number, branch-name, balance)
loan (loan-number, branch-name, amount)
customer (customer-name, customer-street, customer-city)
depositor (customer_name, account_number)
borrower (customer_name, loan_number)
branch (branch-name, branch-city, assets)

Write relational algebra expressions for the following: [2×4]

- a) Find the names and street address of all customers who have an account at the “Thapathali” branch.
- b) Find the names of all customers who have an account with balance more than 10,00,000.
- c) Delete all loan records with amount in the range of 0 to 500.
- d) Show the number of accounts in each branch along with the branch-name.

4. Consider the relational schema given below. [2×4]

Product (pid, name, price, category, maker-cid)
Purchase (buyer-ssn, seller-ssn, quantity, pid)
Company (cid, name, stock price, country)
Person (ssn, name, phone number, city)

- a) Write an SQL query to find the name all products made in “China” with price less than 10,000.
- b) Write an SQL query to create a view to expose product name and total quantity sold from all transactions.
- c) Write a query in SQL to increase the price of all products of “Laptop” category by 5%.
- d) Write an SQL query to create the table Product assuming appropriate data types and mentioning proper primary and foreign key definitions.

5. a) Explain what are super key, candidate key and primary key in tables with proper examples. Explain what is foreign key constraint along with an example. [3+3]
b) Describe what is 2NF and 3NF. Formally define BCNF. [4+2]
6. Explain the process of query optimization. What is heuristic optimization? [6+2]
7. a) What is the difference between primary index and secondary index? Briefly explain what is a hash index. [2+2]
b) What is RAID and what are its advantages? Explain what block level striping is. [2+2]
8. Explain the ACID properties of transactions. Explain the states of a transaction along with a state-transition diagram. [4+4]
9. What is a stable storage? Briefly explain how log-based recovery works. [2+4]
10. Write short notes on the following: [2×3]
 - a) Distributed databases
 - b) Data warehouse
