Tribhuvan University
Institute of Science and Technology
2082
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Bachelor Level / Second Year/ Fourth Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSC 260) — Pass Marks: 24
(Database Management System) — Time: 3 hours.
(OLD COURSE)

Candidates are required to give their answers in their own words as for as practicable.
All figures in the margin indicate full marks.

Section A

Long Answer Questions.
Attempt any TWO questions. **[2×10=20]**

1. Consider the following database schema, where primary keys are underlined.
   EMPLOYEE(EmployeeID, FirstName, LastName, DepartmentID, Salary, HireDate)
   DEPARTMENT(DepartmentID, DepartmentName)
   PROJECT(ProjectID, ProjectName, StartDate, EndDate, DepartmentID)
   Specify the following queries on this database schema. [4+4+2]
   a. Write SQL queries to create three tables in the database with primary key, foreign key, and referential integrity.
   b. Write both SQL and relational algebra query to retrieve first name and last name of all employees along with their department names.
   c. Write SQL query to count the number of employees in each department.
2. How do you convert ER diagram to relations? Explain 2NF and 3NF with suitable examples. [5 + 5]
3. Why do you need concurrency control in databases? Explain lost update problem, dirty read problem, and incorrect summary problem with example. [2 + 8]

Section B

Short Answer Questions
Attempt any EIGHT questions. **[8×5=40]**

4. List characteristics of database approach. What are the advantages of using database approach? [2 + 3]
5. Define data model. What are different categories of data models? [1 + 4]
6. Explain three schema architecture in detail. What do you mean by data independence? [4 + 1]
7. Draw an ER diagram for a **hotel reservation system** including rooms, guests, and bookings. [5]
8. Define specialization. Explain constraints and characteristics of specialization and generalization. [1 + 4]
9. Define the terms domain, attribute, tuple, and relation. What is entity integrity constraint? [4 + 1]
10. Explain desirable properties of transactions. [5]
11. Explain two-phase locking technique. What is lock conversion in this technique? [3 + 2]
12. What is write ahead logging in database recovery? What is checkpoint? [3 + 2]