

Tribhuvan University  
**Institute of Science and Technology**  
 2082  
 ☆

Bachelor Level / Second Year/ Fourth Semester/ Science  
**Computer Science and Information Technology (CSC 265)**  
 (Database Management System)  
**(NEW COURSE)**

Full Marks: 60  
 Pass Marks: 24  
 Time: 3 hours.

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

**Section A**

**Long Answer Questions.**

**Attempt any TWO questions.**

[2×10=20]

1. Consider an online Bookstore, from which customers can buy book. Each customer can place multiple orders. Each order has one or more books. The Bookstore needs to store information about each customers, their orders, and the books available in the store. [6+4]
  - a) Draw an ER diagram for the online Bookstore system including appropriate attributes, keys, and relationships.
  - b) Convert the ER diagram into a relational schema. Show all the primary keys **and** foreign keys.
  
2. Consider the following relational schema:  
 Student(SID, SName, Dept, Year)  
 Course(CID, CName, Credit)  
 Enroll(SID, CID, Grade)  
 Specify the following queries in both SQL and Relational Algebra on this database schema: [10]
  - a) List names of students from the “CSIT” department whose name starts from A.
  - b) Display student names and course names they have enrolled in.
  - c) Count total students enrolled in each course.
  - d) Update grade ‘B’ to ‘A’ for all students in “DBMS”.
  - e) Delete records of students whose Year is 2024.
  
3. Define Normalization. Explain 1NF, 2NF and 3NF with a suitable example. [2+8]

**Section B**

**Short Answer Questions**

**Attempt any EIGHT questions.**

[8×5=40]

4. Differentiate between traditional file processing system and database approach. [5]
5. Explain the concepts of schema, instance, and data independence. [5]
6. Define relational constraints. Explain domain, entity integrity, and referential integrity with examples. [1+4]
7. Explain the basic operations of relational algebra: UNION, INTERSECTION, DIFFERENCE, and CARTESIAN PRODUCT with suitable examples. [5]
8. Explain different types of functional dependencies with example. [5]
9. Explain ACID properties in database [5]

10. What is concurrency control? Explain optimistic and multiversion concurrency control techniques. [1+4]
11. What is a schedule in transaction processing? Explain how concurrency control ensures serializability. [1+4]
12. Explain any one database recovery technique [5]