Graphic Era
HILL UNIVERSITY

End Term (Odd) Semester Examination NOV 2025

Roll no...............................

Name of the Program and semester: BCA /BCA AI &DS/B.Sc IT
Name of the Course: Introduction to Database Management System
Course Code: TBC 302/TBD 302/ TBI 302

Time: 3-hour   Maximum Marks: 100

Note:
- *(i)* All the questions are compulsory.
- *(ii)* Answer any two sub questions from a, b and c in each main question.
- *(iii)* Total marks for each question are 20 (twenty).
- *(iv)* Each sub-question carries 10 marks.

Q1.   (2X10=20 Marks)

a. i. Define the ANSI SPARC three-level architecture of the database system.   Co1

   ii. What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Why?

b. Define the following terms: Co1
   1. Schema and Instances
   2. Domain Integrity Constraint
   3. Generalization
   4. Aggregation
   5. Entity Integrity Constraint

c. The database must store book, author, publisher and warehouse information.   Co1
   - For every book you must capture the title, isbn, year and price information. The isbn value is unique for a book.
   - For every author you must store an id, name, address and the URL of their homepage. Each author can write many books, and each book can have many authors, for example.
   - For every publisher you must store an id, name, address, phone number and an URL of their website.
   - Books are stored at several warehouses, each of which has a code, address and phone number. A book has only one publisher.
   - The warehouse stocks many different books. A book may be stocked at multiple warehouses. The database records the number of copies of a book stocked at various warehouses.

Design an ER diagram for such a bookstore. Your ER diagram must show entities, attributes and the relationships between entities. [Document any assumptions that you make]. Map the ER diagram into corresponding tables.

Q2.   (2X10=20 Marks)

a. i. Discuss the role of database administrator   Co2

   ii. Perform Union, Intersection and Set Difference Operation on the following relations R1 and R2 :

Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination NOV 2025

R1

A	B
A1	B1
A2	B2
A3	B3
A4	B4
A5	B5

R2

A	B
A1	B1
A2	B2
A3	B3
A4	B4
A5	B5

b. What are Integrity Constraints in relational database? Explain the importance of Referential Integrity Constraint. Give example to illustrate the concept.   Co2

c. Explain the concept of keys in database. Define super key, candidate key, primary key, alternate key and foreign key by taking appropriate example.   Co2

Q3.   (2X10=20 Marks)
a. 1. Answer the following: Co3
    i. Is it mandatory for a foreign key to be the primary key in another table?
    ii. Can foreign key have null values in child relation?
    iii. Can foreign keys have duplicate values?
    iv. Can there exist more than one foreign key in a relation?
    v. Can you delete the record from the parent table if the record exists in child table.

2. Explain why Parent key Not Found error occur during the enforcement of foreign keys and how the error will be fixed explain it with proper example.

b. Define the following with example: Co3
    i.   Alter command
    ii. How to add not null constraint
    iii. Drop and truncate
    iv. Rename
    v. Having clause

c. Consider the following to answer the queries given below: Co3
    Lives(Pname,Street,City)
    located_in (Cname, city)
    Manager(Pname,Mgrname)

Write the SQL queries for the following

    i) Find the names of all persons who live in the cityBangalore.
    Ii) Retrieve the names of all person of "Infosys" whose salary is between Rs .50000
    iii)Find the names of all persons who lives and work in the same city
    iv)List the names of the people who work for "Tech M" along with the cities they live in.

Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination Dec 2025

v)Find the average salary of "Infosys" persons

Q4.   (2X10=20 Marks)
    i. a. Explain insertion, deletion and modification anomalies. Why are they considered bad? Illustrate
       with example.   Co4
    ii. With a suitable example explain four Informal Design Guidelines for Relation Schemas

b. Compute the minimal cover of the following set F of functional dependencies for relation schema
R(A,B,C,D,E)   Co4
F={ A→BC, CD→E, B→D, E→A}

c. Define the following: Co4
i. Multivalued Dependency
ii. Join Dependency
iii. BCNF
Iv. Dependency preservation
V.Lossless join

Q5.   (2X10=20 Marks)
a. Define the ACID properties of transaction. During its life cycle a transaction pass through various states,
using the diagram explain all the states.   Co5

b. Why concurrency execution of transaction is required? Explain conflict Serializability. Define when the
schedules are said to be conflict seriaziable.   Co5

c. Define database recovery. Explain the techniques that are used for database recovery.   Co5

Note For the question paper setters:
   • Question paper should cover all the COs of the course.
   • Please specify COs against each question.