Graphic Era
HILL UNIVERSITY
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End Term (Odd) Semester Examination December 2024

Roll no... 2992001

Name of the Course and semester :BCA III Semester
Name of the Paper: Introduction to Database Management Systems
Paper Code: TBC-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 is 20 (twenty).
- *(iv)* Each sub-question carries 10 marks.

Q1.   (2X10=20 Marks)
a. Discuss the main characteristics of the database approach and how it differs from traditional file systems.Describe the three schema architecture of database.   (CO1)

b. Define data abstraction and explain its importance in DBMS.Describe the three levels of data abstraction in detail.   (CO1)

c.Draw ER diagram for Library Management System .Define the basic concepts of ER model including entity,attributes,composite attributes,multi valued attributes,derived attributes,key attributes.   (CO2)

Q2.   (2X10=20 Marks)
a. List the operations of relational algebra and the purpose of each.What is union compatibility?Why do the UNION,INTERSECTION,and DIFFERENCE operations require that the relations on which they are applied be union compatible.   (CO3)

b. Explain how entity integrity will be maintained within the database schema.Create a table schema with at least three types of constraints and explain their purpose in ensuring data reliability.   (CO4)

c.Consider the following relational schemas: (CO3)
Sailors (sailorid, sailorname, rating, age)
Reservation (sailorid, boatid, date)
Boats (boatid, bname, color)
Design Relational algebra queries :
i.   Display sailor name and rating of sailors whose age is less than 35 years.
ii.   Display sailorid of sailors who are booked on 13th December 2024 and 16 December 2024.
iii. Find names of sailors who've reserved boat 103
iv.   Find names of sailors who've reserved a red boat
v.   Rename the Sailor relation as S and attributes of relation Sailorid as sid, Sailorname as sname and rating as r and age as a.

Q3.   (2X10=20 Marks)
a.Define SQL and list its main characteristics. Identify the different types of commands used in SQL. (CO3)
b.Consider the following relational schemas: (CO3)
COURSE(CourseCode,CourseName,CourseFees,Department)
STUDENT(RollNo,Name,City)
REGISTER(RollNo,CourseCode)
Write an SQL query to display course codes along with the total number of registrations for each course.

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Write an SQL query to display the details of courses where the fee is greater than the average fee of all courses.

Create a query that includes additional details, such as the registration date or course instructor, while ensuring unregistered students are still listed.

c. Differentiate between: (CO3 & CO4)
i.   Primary Key and Foreign key
ii. Roll back and Commit commands
iii. WHERE and HAVING clauses in SQL

Q4. (2X10=20 Marks)

a. Discuss the motivation behind the normalizing the database. Classify different normal forms. Differentiate between 3NF and BCNF

b. Given a relation R(P, Q, R, S, T) and Functional Dependency set FD = { PQ → R, S → T }, determine whether the given R is in 2NF? If not, convert it into 2 NF. (CO4)

c. Define the three types of data anomalies caused by data redundancy. Provide an example of a database scenario where data redundancy causes anomalies. Identify the anomalies in the given example. (CO4)

Q5. (2X10=20 Marks)

a. Define a transaction system. Discuss ACID properties of transaction? (CO5)

b. List and explain the types of schedules in transaction systems. Define serializability in transaction processing system. Analyze the differences between non-serial and serializable schedules. (CO5)

c. Describe the concept of view serializability and discuss how concurrency control mechanisms contribute to maintaining consistency in a database system. (CO5)