Graphic Era
HILL UNIVERSITY

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Mid Term (Odd) Semester Examination October 2024

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

Name of the Course and semester: **B. Tech. 5th Sem.**
Name of the Paper: **Database Management Systems**
Paper Code: **TCS-503**
Time: 1.5 hour   Maximum Marks: 50

Note:
  (i)   Answer all the questions by choosing any one of the sub questions
  (ii)   Each question carries 10 marks.
  (iii) Please specify COs against each question.

Q1.   (10 Marks)
  a. How DBMS is useful to access and manipulate the data? Discuss the main characteristics of the database approach and specify how it differs from traditional file system.   (CO1)
                                   OR
  b. Explain three- schema architecture with diagram. Also illustrate the steps involved in designing a database with an appropriate example.   (CO1)

Q2.   (10 Marks)
  a. Consider the following case study describing the academic functioning of your college. (CO2)
  * A college has many departments.
  * A department would have many students as well as many faculty members.
  * A student can register into various courses; similarly a course can be registered by many students.
  * A student lives in a single hostel but a hostel accommodates many students.
  * A department offers many courses but a particular course is offered by a particular department.
  * A faculty teaches many courses. A course is taught by many faculties.

Model an E-R diagram for the above scenario. (You need to define all the necessary entities along with the set of attributes associated with each entity. Moreover you also need to define the relationship between entities according to the case study and then model an E-R diagram accordingly)
                                   OR
  b. Illustrate how the composite and multi-valued attributes are stored into the relational model? Consider the given requirement analysis based upon two entities (Emp and Dept).   (CO2)
  * Every employee works for exactly one department.
  * A department can have many employee working in it.
  * A newly formed department need not have any employee working in it.

For the above requirement analysis draw the min-max representation of an E-R model and find out the following:
  (i)   What is the degree of a relationship?
  (ii) What is the cardinality ratio of an entity employee and a department?
  (iii) What is the participation or existence constraint of employee and department?
  (iv) What is the minimum number of tables required to convert the given requirement analysis into the relational model?

Q3.   (10 Marks)
a. Consider the given relational schema   (CO3)
  STUDENT (S_RollNo, Std_Name, Std_Age, Std_Marks, Std_City)

For the given schema apply the following data types with constraints while designing the schema.
  * For the S_RollNo field, set the data type as integer with primary key constraint. This field will also allow all the roll numbers should be greater than zero.
  * For the Std_Name field, set the data type as VARCHAR (20) and it will not allow null values.
  * For Std_Age field, set the data type as integer. Moreover, this field will not allow any student having age less than 18 years.
  * For the field Std_Marks set the data type as integer with default marks as 75.
  * For the field Std_City set the data type as VARCHAR (25).

Mid Term (Odd) Semester Examination October 2024

Using the above schema, write the SQL query for the following:

(i) Insert the following data into the STUDENT table
[(10, 'Aditya', 19, 70, 'Dehradun'), (11, 'John', 20, 85, 'Delhi'), (12, 'Bob', 23, 65, 'Mumbai')]
(ii) Display the student's record who belong to the city Delhi or Mumbai using IN operator.
(iii) Display the total marks obtained by all the students.
(iv) Update the student name from 'Aditya' to 'Aditya Raj'.
(v) Display the student's record whose names start with letter 'A' or whose city names ends with letter 'i'.

OR

b. Consider the given relational schema with set of attributes followed by data types defined:
DEPARTMENT (Did: integer, D_name: string, D_location: string)
EMPLOYEE (empId: integer, Emp_name: string, Emp_salary: integer, Emp_city: string, Did: integer)
(CO3)

Perform the following SQL query on the above schema:

(i) Retrieve the employee name, department name, and city name for those employees who are working in a department.
(ii) Retrieve the employee information who are getting the same salary.
(iii) Count the total number of employee city-wise.
(iv) Display the names of employees who belong to the same city (use IN operator).
(v) Display the employee name and salary (city-wise) for employees, who are getting salary greater than or equal to 50000.
(vi) Display the top three employee's information who are getting the highest salary.

Q4. (10 Marks)
a. What do you mean by a key? How key play a crucial role to access and manipulate the data in the relational database system? Justify your answer. Also explain the various types of keys used in DBMS with suitable example.
(CO1)

OR

b. Why the constraints are important to apply on schema design in order to achieve the data integrity, data accuracy and data consistency? Justify your answer. Also explain various types of integrity constraints in DBMS with proper example. (CO1)

Q5. (10 Marks)
a. Explain weak entity and a strong entity. Why the participation of a weak entity in the relationship with the strong entity is always total? Justify your answer with an appropriate example. Also list out at least five aggregate functions used in SQL? You can assume any entity for your reference to explain all the aggregate functions with example. (CO2)

OR

b. Explain with two examples why the set {σ, Π, U, -, X} is called the complete set of relational algebra operation. Consider the given relational schema: (CO2)
STUDENT (SId, S_name, S_age, S_gender, S_city)

Write the queries for the following in relational algebra.
(i) Display the student id and student city name.
(ii) Display the student name whose city is 'Mumbai'.
(iii) Display the student city name whose id is 1 and name is 'Reena'.
(iv) Retrieve the student's detail till student id 10.
(v) Display the student gender whose id is 20 and city name is 'Mumbai'.