

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-VI Semester (ECM)

COURSE CODE(CREDITS): 20B11EC611 (3)

MAX. MARKS: 35

COURSE NAME: DATABASE SYSTEMS

COURSE INSTRUCTORS:Dr. Nishant Jain

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1.

- a. Explain the concept of physical data independence and its importance in database systems.
- b. With the help of an example, explain the following.
 - i. Difference between Simple and composite attributes.
 - ii. Difference between Single-valued and multivalued attributes.
 - iii. Derived attributes.

[3+5=8]CO1,7

Q2. Consider the database given below

employee (person_name, street, city)

works (person_name, company_name, salary)

company (company_name, city)

Write an expression in the relational algebra to express each of the following queries:

- a. Find the name of each employee who lives in the city "Miami".
- b. Find the name of each employee whose salary is greater than \$100000.
- c. Find the name of each employee who lives in "Miami" and whose salary is greater than \$100000.

[3]CO2,4

Q3. Consider the relational database below, where the primary keys are underlined.

employee (ID, person_name, street, city)

works (ID, company_name, salary)

company (company_name, city)

manages (ID, manager_id)

Give an expression in SQL for each of the following queries.

- a. Find the ID, name, and city of residence of each employee who works for “First Bank Corporation”.
- b. Find the ID, name, and city of residence of each employee who works for “First Bank Corporation” and earns more than \$10000.
- c. Find the name of the company that has the most employees (or companies, in the case where there is a tie for the most).
- d. Find the name of each company whose employees earn a higher salary, on average, than the average salary at “First Bank Corporation”. [4]CO2,4

Q4.

- a. Explain how the ER model is different from the relational model?
- b. Consider a set of Instructor (with attributes ID, name and salary) and student (with attributes ID, name, total_credit), and given that one Instructor can act as a project supervisor to more than one student but vice-versa is not true, draw an ER model to show a relationship between the Instructors and the students. Also record a date on which a student meets the supervisor.
- c. A weak entity set can always be made into a strong entity set by adding to its attributes the primary-key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so.
- d. Draw and explain with the help of an example, how the following relations are represented in ER model
 - i. One-to-One Relationship
 - ii. One-to-Many Relationship
 - iii. Many-to-One Relationship
 - iv. Many-to-Many Relationship

[2+3+3+2=10]CO3,CO4

Q5. Construct an ER diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

[3]CO3

Q6.

- a. Explain the difference between heap and sequential file organization.
- b. What is the primary purpose of an indexing mechanism in a database? How does it improve query performance?
- c. What are the primary differences between primary indexing and secondary indexing in a database, and how do they impact query performance and data retrieval?

[2+2+3=7]CO5,6