

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: CSE

SEMESTER : IV
SESSION : SP/2024

SUBJECT: CS237 DATABASE MANAGEMENT SYSTEMS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
-

- | | | CO | BL |
|--------|--|----------|----|
| Q.1(a) | For the system to be usable, it must retrieve data efficiently. The need for data efficiency has led database system developers to use complex data structures to represent data in the database. Since many database-system users are not computer trained, developers hide the complexity from users through several levels of data abstraction, to simplify users' interactions with the system.
Enlist and discuss these levels of abstraction. Also give a schematic diagram depicting these levels. | [5]
1 | 2 |
| Q.1(b) | Design a database for an airline. The database must keep track of customers and their reservations, flights and their status, seat assignments on individual flights, and the schedule and routing of future flights.
Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints. | [5]
2 | 3 |
| Q.2(a) | Think of an instance of relational table <i>instructor</i> for which schema is given below. In this instance, no two instructors have the same name. From this, can we conclude that <i>name</i> can be used as a <i>super-key</i> (or <i>primary key</i>) of <i>instructor</i> ? Justify your answer with the help of suitable example(s).
: <i>instructor</i> (<i>ID</i> , <i>name</i> , <i>dept_name</i> , <i>salary</i>) | [5]
2 | 3 |
| Q.2(b) | Consider the bank database given below, where the primary keys are underlined. Construct the following SQL queries for this relational database. <ul style="list-style-type: none">- Find the ID of each customer of the bank who has an account but not a loan.- Find the ID of each customer who lives on the same street and in the same city as the customer '12345'.- Find the name of each branch that has at least one customer who has an account in the bank and who lives in "Harrison".
: <i>branch</i> (<u>branch_name</u> , branch_city, assets)
: <i>customer</i> (<u>ID</u> , customer_name, customer_street, customer_city)
: <i>loan</i> (<u>loan_number</u> , branch_name, amount)
: <i>borrower</i> (<u>ID</u> , <u>loan_number</u>)
: <i>account</i> (<u>account_number</u> , branch_name, balance)
: <i>depositor</i> (<u>ID</u> , <u>account_number</u>)
Any missing information may be assumed suitably. However, it must be specified in your answer. | [5]
2 | 3 |
| Q.3(a) | Explain what is meant by repetition of information and inability to represent information. Explain why each of these properties may indicate a bad relational database design. Your answer must be explained with help of suitable example schemas and instances. | [5]
2 | 4 |

PTO

- Q.3(b) Propose a relational schema which is not in the first normal form. Convert your schema to the first normal form. [5] 2 6
 Now consider a different schema (for the very same database application) which is not in the second normal form. Your task is to convert it to the second normal form. Choice of your schema should be such that the resulting schema is not in the third normal form. As a database designer you are supposed to make assumptions regarding functional dependencies and keys. However, your any such assumptions must be specified within the answer.
- Q.4(a) There are two types of ordered indices that we can use. These are *dense index* and *sparse index*. When is it preferable to use a dense index rather than a sparse index? Explain your answer. [5] 2 2
- Q.4(b) Discuss the needs behind *hashing* in database management systems. What are the problems with *static hashing*? [5] 2 2
- Q.5(a) List the ACID properties. Explain the usefulness of each. [5] 4 2
- Q.5(b) Explain the distinction between the terms *serial schedule* and *serializable schedule*. [5] 4 2

:::::25/04/2024:::::M