[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
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B. Tech 5th Semester Examination

Database Management System (O.S.)

IT (ID)-5002

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all. Select one question from each of section A, B, C, D. Section E is compulsory.

SECTION - A

1. (a) What is data abstraction and what are its levels. Specify the inter-relation among these levels. **(10)**

   (b) What is the difference between record-based data models and physical data models? Specify different sub-types of data models with in record-based data models and physical data models. **(10)**

2. (a) How DDL is different from DML? Give usage of each. Give different types of DMLs and their use. **(10)**

   (b) Explain the difference between physical and logical data independence. **(10)**

SECTION - B

3. (a) Differentiate among primary key, candidate key and superkey. Give proper example **(10)**

   (b) In relational algebra what is join operation? Clearly explain each of theta join, equi-join and natural join and outer join. **(10)**

4. (a) Explain the difference between strong entity set and weak entity set. How can a week entity set be converted into a strong entity set? If a weak entity set can be converted into strong entity set, then why do we have weak entity set? **(10)**

   (b) Prepare an E-R diagram for library management software. **(10)**

SECTION - C

5. (a) Consider the following employee database, where the primary keys are underlined.

   Employee (employee-name, street, city)

   Works (employee-name, company-name, salary)

   Company (company-name, city)

   Managers (employee-name, manager-name)

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

   (i) Find the names of all employees who work for State Bank of India and live in Delhi.

   (ii) Find the names, street addresses and cities of residences of all employees who work for First Bank Corporation and earn more than Rs. 10000.

   (iii) Find all employees who do not work for State Bank of India.

   (iv) Find the company that has the smallest payroll.

   (v) Find all employees in the database who do not live in the same cities and on the same streets as do their managers. **(10)**

(b) What is functional dependency? What is closure of a set of functional dependency? List all functional dependencies satisfied by the relation below: **(10)**

A	B	C
a_1	b_1	c_1
a_1	b_1	c_2
a_2	b_1	c_1
a_2	b_1	c_3

6. (a) Consider the following relation : R(A, B, C, D)

The primary key of the relation is A. The following functional dependencies hold:

$A \rightarrow B, C$

$B \rightarrow D$

Is the above relation in third normal form?

Also, differentiate between 3NF and BCNF. **(10)**

(b) What is hashing and what are its different types? How hashing is better than indexing? How collisions are handled in hashing? **(10)**

SECTION - D

7. Define a transaction. Then discuss the following with relevant examples:

- A read only transaction
- A read write transaction
- An aborted transaction

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With a neat sketch discuss the states a transaction can be in. Also, explain the distinction between the terms serial schedule and serializable schedule. Give relevant example. **(20)**

8. How concurrency is performed? Explain the protocol that is used to maintain the concurrency concept. When is a transaction said to be deadlocked? Explain the deadlock prevention methods with an example. **(20)**

SECTION - E

9. (a) Define triggers. Give example. **(2)**

   (b) What is the role of a DBA? **(2)**

   (c) Differentiate between super key and primary key. **(2)**

   (d) With an example explain what a derived attribute is? **(2)**

   (e) List the two types of embedded SQL SELECT statements. **(2)**

   (f) What is lossless decomposition? Give example. **(2)**

   (g) What is multivalued dependency? Give example. **(2)**

   (h) What is referential integrity constraint? **(2)**

   (i) Give advantages of B+ trees over indexing and hashing. **(2)**

   (j) What is transaction roll back? Why is it needed? **(2)**