Duration : 02:00 Hours                                                        Max Marks : 50

Instructions :

1. All questions are compulsory.
2. Use of scientific calculator is allowed.
3. Draw diagrams wherever necessary.

Unit-1

Q No 1 a)                                                                                          (5)

Discuss the design process & phases for a good database design in brief.

Unit-2

Q No 2 a)                                                                                          (5)

Discuss the Web application architecture. What is the significance of MVC?

Unit-3

Q No 3 a)                                                                                          (5)

Discuss the role of Application security measures in a database system.

Unit-4

Q No 4 a)                                                                                          (5)

From the perspective of a database application, what are the factors that govern the selection of a physical storage medium?

Unit-5

Discuss Multitable Clustering File Organization, as a file storage technique.

For the relations given below:

| dept_name | building | budget |
|---|---|---|
| ECE | Taylor | 100000 |
| Physics | Watson | 70000 |

The *department* relation

| ID | name | dept_name | salary |
|---|---|---|---|
| 10101 | Sanjay | ECE | 65000 |
| 33456 | Prince | Physics | 85000 |
| 41565 | Vishal | ECE | 75000 |
| 50021 | Rudra | ECE | 50000 |

The *instructor* relation

Write an SQL query that computes a natural join of the *department* and the *instructor* relations. Show the resultant multitable clustering file structure.

Unit-6

Discuss the properties of transactions that a database system should maintain.

Unit-7

Referring to a simple transaction model:
a) Write a transaction that transfers Rs.500 from account A to account B, adhering to the ACID properties.
b) Show a condition in the transaction that can be termed as an Inconsistent state.
[Given: Before the transactions; account A and account B have Rs.1000 and Rs.2000 respectively]

Unit-8

Discuss as to why concurrency is preferred in transaction management in databases. Let T1 and T2 be the two transactions. Transaction T1 transfers $500 from account A to account B, whereas transaction T2 transfers 10% of the balance from account A to account B.

Assuming a serial scheduling scenario, write the transactions in the order:
a) T1 followed by T2
b) T2 followed by T1
Compare the results and comment on its consistency.

[Given: Prior to the transactions; account A and account B have $2000 and $3000 respectively]

Unit-9

Let A and B be two accounts that are accessed by transactions T1 and T2.

a) Make a serial schedule and write transaction T1, that transfers $50 from account B to account A.

b) Make a serial schedule and write a transaction T2, that displays the total amount in the accounts A and B (i.e A+B).

NOTE: Make use of locks for these transactions to ensure Isolation.

[Given: Prior to the transactions; account A and account B have $1000 and $500 respectively]

Unit-10

Elaborate on query processing in a database system. Explain the steps involved in it with a suitable diagram.