

B2.3-R5 : ADVANCED DATABASE TECHNOLOGIES

NOTE :

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Total Time : 3 Hours

Total Marks : 100

1.
 - (a) What is Parametric Query Optimization ? Discuss.
 - (b) Briefly discuss the usages of Rollback Segment.
 - (c) What is MariaDB ? Discuss its importance.
 - (d) List down the DDL (Data Definition Language) commands. Also discuss, for what purpose these commands are used.
 - (e) Briefly discuss some of the SQL injection attacks.
 - (f) What is content-based image retrieval ? How it is different than text-based image retrieval ?
 - (g) Discuss following pre-defined exceptions in PL/SQL : STORAGE_ERROR, INVALID_CURSOR, INVALID_NUMBER, and LOGIN_DENIED (7x4)

2.
 - (a) What is PL/SQL Trigger ? Mention some of the advantages of Triggers. Further, consider a table, "Customers" with following fields : Customer ID, Name, Age, Address, and Salary. Write a program to create a row level trigger for the Customers table that would fire for INSERT or UPDATE or DELETE operations performed on the Customers table. This trigger should display the salary difference between the old values and new values.
 - (b) In context of database system, briefly discuss the importance of database buffer and the role of buffer manager. Also discuss following methods used by buffer manager to serve the database system in the best possible way : Buffer Replacement Strategy, Pinned Blocks, and Forced Output of Blocks. (9+9)

3.
 - (a) How is Database-as-a-Service (DBaaS) different from Database Management ? Also mention the benefits of DBaaS ?
 - (b) Explain ACID properties in DBMS with their suitable example.
 - (c) What is data integrity ? Briefly discuss along with following four forms of data integrity in databases : Entity Integrity, Referential Integrity, Domain Integrity, and User-Defined Integrity. (6+6+6)

4.
 - (a) Log-based recovery and Checkpoint based recovery are often used approaches in database recovery. Briefly discuss both the approaches.
 - (b) What is ETL (Extract, Transform, and Load) ? How does it work ? (9+9)

5. (a) Differentiate between Operational Database and Data Warehouse.
 (b) A table, "Student" is presented below. Discuss, whether the table, "Student" is in 4NF or not. If not, then make it into 4NF.

Table : "Student"

STU_ID	COURSE	HOBBY
21	Computer	Dancing
21	Math	Singing
34	Chemistry	Dancing
74	Biology	Cricket
59	Physics	Hockey

- (c) Briefly explain following operations in relational algebra : Project Operation (π) and Union Operation (\cup). Also, find out
 π Cust_Name (Borrow) \cup π Cust_Name (Depositor)
- Where, Borrow and Depositor are the two tables given subsequently, and Cust_Name is one of the attributes in both the tables.

Table : Borrow

Cust_Name	LOAN_NO
Jones	L-17
Smith	L-23
Hayes	L-15
Jackson	L-14
Curry	L-93
Smith	L-11
Williams	L-17

Table : Depositor

Cust_Name	Account_No
Johnson	A-101
Smith	A-121
Mayes	A-321
Turner	A-176
Johnson	A-273
Jones	A-472
Lindsay	A-284

(6+6+6)

6. (a) Explain R Tree with its example and mention its properties. Compare R Tree and Quad Tree.
 (b) Entity, attributes, and relation are the different components of E-R model in DBMS. Briefly discuss, entity and its types, attributes and its types, and relation and its types. (9+9)
7. (a) A deadlock can be prevented if the resources are allocated in such a way that deadlock never occurs. Discuss and compare, Wait-Die scheme and Wait-Wound scheme for deadlock prevention.
 (b) Explain the Dirty Read Problem with suitable example.
 (c) In distributed database, replication and fragmentation are the most common ways to store data on different sites. Discuss both ways in brief. (6+6+6)

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