Total No. of questions : 6] Roll No. .....]

B.Tech(CSE/DSML/Cyber Forensic) IV Semester (Regular & Ex.)
End-Term Examination, May-June-2022

DATA BASE MANAGEMENT SYSTEM
(CSL-0407)

Time: 03:00 hours Max. Marks: 40

Note : Attempt all questions.

1.1 What do you mean by program-data independence? CO1 1

1.2 Briefly explain the terms defining, constructing and manipulating the database. CO1 2

OR

Define meta data, schema and sub-schema.

1.3 Describe the three-schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture? CO2 3

OR

How DBMS ensures data independence? Differentiate between conceptual and physical data independence

2.1 Differentiate between composite attribute and multivalued attribute with example. CO1 1

2.2 Draw the ER-notations for the following terms: Entity, derived attributes, multi-valued attributes and Key attributes. CO2 2

OR

Differentiate between strong and weak entity set with example

2.3 What is the difference between specialization and generalization? Why do we not display this difference in schema diagrams? CO2 3

OR

What is relationship in ER model concepts? Explain mapping cardinalities between entities with suitable examples.

3.1 What is data anomaly? List all the anomalies which occurs in redundant data. CO3 1

3.2 What is outer join operation? Consider the following two table and find the output of the following relational algebra expressions. CO2 2

TABLE T1

P	Q	R
10	a	5
15	b	8
25	a	6

TABLE T2

A	B	C
10	b	6
25	c	3
10	b	5

i. $T1 \bowtie_{T1.Q=T2.B} T2$

ii. $T1 \bowtie_{(T1.P=T2.A \text{ AND } T1.R=T2.C)} T2$

OR

Discuss the entity integrity and referential integrity constraints. Why each one is important?

3.3 Consider the following relations for a database that keeps the track of business trips of salesperson in a sales office. CO3 3

Salesperson (SSN, name, start_year, Dept_no)
Trip (SSN, from_city, to_city, departure_date, return_date, Trip_id)
Expense (Trip_id, Account#, Amount)

Specify the foreign key for the above schema, stating any assumptions you make. Then specify the following queries in relational algebra. 6

(i) Give the details (all attributes of trip relation) for trips that exceeded 2000$ in expenses.

(ii) Print the SSN of sales person who took trips to 'Honolulu'.

(iii) Print the total trip expenses incurred by the sales person with SSN='234-56-7890'.

OR

Consider the relation schema emp_dept and following set of functional dependency G on emp_dept: G = {SSN→{ENAME, BDATE, ADDRESS, DNUMBER}, DNUMBER→{ DNAME, DMGRSSN}}. Find the closures {SSN}+ and {DNUMBER}+ with respect to G

4.1 Write the various states of transactions CO1 1

4.2 Explain the concepts of transaction. Discuss its ACID property. CO1 2

OR

What is recoverable schedule? Why recoverability of schedule is desirable?

4.3 What is serializability? Differentiate between the conflict and view serializability techniques. CO1 3

OR

Why there is a need of concurrency control in transaction concepts? Explain with example.

5.1 What is the meaning of W-timestamp (Q_k) of a transaction? CO1 1

5.2 What is multi-version scheme? Discuss the Multi-version Timestamp Ordering protocol in detail Co1 2.

OR

What is lock based protocol? Describes different types of locks.

5.3 Consider the following two transactions: CO4 3

T1: read (A);	T2: read(B);
Read (B);	read(A);
If A=0 then B:=B+1;	if B=0 then A:=A+1;
Write (B);	write (A);

Add locks and unlock instructions in T1 and T2, so that they observe the two-phase locking protocol. Can the execution of these transaction result in a deadlock?

OR

What is deadlock? Discuss the deadlock detection and recovery scheme with suitable example.

6. Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional dependencies G={{A, B}→{C}, {A}→{D,E}, {B}→{F}, {F}→{G,H}, {D}→{I,J} }. What is the key for R? Decompose R into 2NF and then 3NF relations. CO4 CO5 **10**

OR

Draw the ER diagram for the below given scenario.

ITM Community Hospital (ITMCH) is a non-profit general care hospital located in a growing suburban community in a major metropolitan area. Although it is moderate in size (about 150 beds), it is currently the only hospital in the North area. Because of population growth and aging, ITM Community Hospital (ITMCH) expects the need for health services to grow exponentially. It wants to develop as a hub for health services in the region. Under this scenario, it would establish a separate corporate headquarters and an information network to support all health services. The hospital has several functional areas that include Human Resource, Accounting, and Purchase, Patient Service (outpatient and inpatient), Patient care (Doctors, Nurses, Pharmacy) and support services. All the departments are managed by managers. Each department has the needed manpower and resources to perform its functions

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