Total No. of printed pages = 4

CSE 181501

Roll No. of candidate | | | | | | | | | | |

17/2/22 2021

B.Tech. 5th Semester End-Term Examination

CSE

DATABASE MANAGEMENT SYSTEM

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question number one and any four from the rest

1. Answer the following (10 × 1 = 10)

(i) Consider the relational instance :

P	Q	R
3	4	2
1	5	3
1	6	3
3	4	2

Which of the following functional dependencies are satisfied by the above instance?

(a) $PQ \rightarrow R$ and $R \rightarrow Q$ (b) $QR \rightarrow P$ and $Q \rightarrow R$

(c) $QR \rightarrow P$ and $P \rightarrow R$ (d) $PR \rightarrow Q$ and $Q \rightarrow P$

(ii) Consider a transaction involving two bank accounts X and Y

Read(X)
X: = X – 50
Write(X)
Read (Y)
Y: = Y + 50
Write(Y)

The constraint that the sum of the accounts X and Y should remain constant is that of :

(a) Atomicity (b) Consistency

(c) Isolation (d) Durability

[Turn over

(iii) Consider the following relation schemas

Student (roll, name, address)

Enrolment (roll, courseno, coursename)

The primary keys are underlined. The number of tuples in Student and Enrolment tables are 120 and 8 respectively. What are the maximum and minimum number of tuples that can be present in Student * Enrolment where '*' represents natural join?

(a) 8, 8 (b) 120, 8

(c) 960, 8 (d) 960, 120

(iv) Which of the following statements is FALSE about normal forms?

(a) BCNF is stricter than 3NF

(b) Lossless, dependency preserving decomposition into 3NF is always possible

(c) Lossless, dependency preserving decomposition into BCNF is always possible

(d) Any relation with two attributes is always in BCNF

(v) Which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?

I. Two-phase locking

II. Timestamp ordering

(a) I only (b) II only

(c) Both I and II (d) Neither I nor II

(vi) The value of the expression TRUE OR NULL is ————————

(vii) Which of the following is not a database model?

(a) Network data model (b) Object relational data model

(c) Normal form data model (d) Hierarchical data model

(viii) R (A, B, C, D, E, F, G, H) is a relational schema with the dependencies $F = \{CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG\}$.

The number of candidate keys of R is :

(a) 2 (b) 3

(c) 4 (d) 1

(ix) In converting an ER model into an equivalent relational model, for a representing a one-to-many relationship, the primary key of the ———— side table is placed as a foreign key in the ———— side table.

(x) Snowflake schema is used in

(a) Object-based model (b) Network model

(c) Data warehouse (d) Parallel databases

2. (a) A library has many books and students are members of the library. A student can issue many books and a book can be issued to different students at different points of time. The date on which a book is issued is also an important piece of information. Represent these facts using ER model. (4)

(b) Give one example of DDL and one example of DML in SQL. (3)

(c) Define the following in connection with relational data model : (4)

(i) Candidate key

(ii) Foreign key

(d) What is a lossy join? Explain with the help of an example. (4)

3. (a) Give example of a relational schema that has insertion and deletion anomalies. You need to explain how these anomalies are present. (4)

(b) Define the following : (4)

(i) Second Normal Form

(ii) BCNF

(c) Explain the isolation property of a transaction. (3)

(d) Consider the relation schema R (H, I, J, K, L, M, N, O) with the functional dependencies : (4)

$H,I \rightarrow J,K,L$

$J \rightarrow M$

$K \rightarrow L$

$L \rightarrow 0$

Find the normal form the given relation schema R is in.

4. (a) Consider the following schedule involving three transactions T_1, T_2 and T_3 : (3)

T_1	T_2	T_3
Read(Q)		
	Write(Q)	
Write(Q)		
		Read(Q)
		Write(Q)

Draw a precedence graph for the above schedule and check if the schedule is conflict serializable.

(b) State the two-phase locking protocol. Can it ensure recoverable schedules? (4)

(c) Consider the following tables : (4)

Employee (Code, Name, Salary, Department_Number)

Department (Dept_Number, Dept_Name)

The primary keys have been underlined. Write SQL statements for the following queries :

(i) List the department number of those departments where more than fifty employees work.

(ii) List the names of departments where no employees work presently.

(d) State and explain two features of SQL that can be used for access control. (4)

5. (a) State two rules that can be used for transformation of relational expressions in query processing. (3)

(b) What is the advantage of dynamic hashing over static hashing? (4)

(c) Explain the basic principle of hash join strategy. (4)

(d) How can ordering of join operations can be used to optimize query evaluation? (4)

6. (a) Using a system log with checkpointing, how would you find the lists of transactions that are to be redone and undone during recovery from crash? The database modification is immediate. (4)

(b) Consider a relation schema R (A, B, C, D, E, F) with the functional dependencies F= {A → B, C → DF, AC → E, D → F}. Decompose R into a set of BCNF relations. Is the decomposition dependency preserving? (4)

(c) Explain the meaning of horizontal fragmentation in the case of a distributed database. (3)

(d) What is the use of views in SQL? (4)

7. Write short notes on the following :

(a) Data mining (4)

(b) Intrusion detection (3)

(c) Logical database (4)

(d) Web database (4)