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Total Number of Pages: 02

B.Tech
FEEC6301

5th Semester Back Examination 2017-18
Data Base Management Systems
BRANCH : AEIE, ECE, EEE, EIE, ELECTRICAL, ETC, IEE
Time: 3 Hours
Max Marks: 70
Q.CODE: B143

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

- a) Define the following terms: primary key, candidate key, foreign key and super key.
- b) Draw an E-R diagram to depict the features of specialization and generalization.
- c) For the relations R and S given below compute the following relational algebra operations: (i) $\Pi_{A,C}(R)$ (ii) $\sigma_{B=2}(S)$ (iii) Natural Join (iv) Cartesian Product

R

A	B	C
1	2	3
4	5	6
7	8	9

S

B	C	D
2	3	10
2	3	10
6	7	12

- d) Suppose that we decompose the schema $R=(A, B, C, D, E)$ into (A, B, C) and (A, D, E) . Show that this decomposition is a lossless-join decomposition if the following set F of functional dependencies holds:
 $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$
- e) Explain the relevance of System Catalogue in a Database System.
- f) Differentiate between DDL and DML along with some examples of both.
- g) List all possible sequences of states through which a transaction may pass during its lifetime.
- h) What is a recoverable schedule? Why is recoverability of schedules desirable?
- i) What is timestamp ordering based concurrency-control scheme?
- j) What is checkpoint mechanism? How often should checkpoints be performed?

Q2 a) Differentiate between logical database design and physical database design. (5)
 Show how this separation leads to data independence.

b) Compare the three data models namely relational, network and hierarchical (5)
 along with their advantages and disadvantages.

Q3 a) Draw and explain the three level architecture of the database system. (5)

b) Construct an E-R diagram for a hospital with a set of patients and a set of (5)
 medical doctors. Associate with each patient a log of the various tests and examinations conducted. The hospital tables are as follows :

patients(patient-id, name, insurance, date-admitted, date-checked-out)
 doctors(doctor-id, name, specialization)
 test(testid, testname, date, time, result)
 doctor-patient(patient-id, doctor-id)
 test-log(testid, patient-id)

performed-by(testid, doctor-id)

Tables mentioned in italics indicate the various relationships among the three entities patients, doctors and test. The underlined attributes signify the primary key in each table.

- Q4 a)** Consider the following relations: **(5)**
S (S#, SNAME, STATUS, CITY)
SP (S#, P#, QTY)
P (P#, PNAME, COLOR, WEIGHT, CITY)
Give an expression in SQL for each of queries below:
(i) Get supplier names for supplier who supply at least one red part
(ii) Get supplier names for supplier who do not supply part P2.
- b)** Consider the following relational schema: **(5)**
PERSON (SS#, NAME, ADDRESS)
CAR (REGISTRATION_NUMBER, YEAR, MODEL)
ACCIDENT (DATE, DRIVER, CAR_REG_NO)
OWNS (SS#, LICENSE)
Construct the following relational algebra queries:
(i) Find the names of persons who are involved in an accident.
(ii) Find the registration number of cars which were not involved in any accident.
- Q5 a)** What are inference rules for functional dependencies? Discuss the **(5)**
Armstrong's Inference rules. Use Armstrong's axioms to prove the soundness of the decomposition rule.
- b)** Consider the relation schema $R = (A, B, C, D, E)$ with the following set of **(5)**
functional dependencies $F = \{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$. Suppose R is decomposed into $R_1(A, B, C)$ and $R_2(A, D, E)$. Check whether this decomposition satisfy the properties of lossless-join decomposition and dependency-preserving.
- Q6 a)** Explain the concept of conflict serializability with example of an conflict **(5)**
serializable schedule.
- b)** Compare the deferred-modification and immediate-modification versions of **(5)**
the log-based recovery scheme with suitable examples.
- Q7** What is two-phase locking protocol? Discus the different variants of the **(10)**
protocol. Show that the two-phase locking protocol ensures conflict serializability and transactions can be serialized according to their lock points.
- Q8** **Write short answer on any TWO :** **(5 x 2)**
- a)** Tuple Relational Calculus vs. Domain Relational Calculus
b) ER Model to Relational Model Mapping
c) Precedence Graph
d) Types of Database Failure