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B. TECH.**FOURTH SEMESTER EXAMINATION, 2017-18****DATABASE MANAGEMENT SYSTEM**Time : **3 Hours**Max. Marks : **60**

Note : (i) Attempt **ALL** questions.
(ii) Choices are given in each question set.

1. Attempt any **Four** of the following questions: **3 x 4 = 12**

- (a) Construct an E-R diagram of a banking system enterprise. It provides different kinds of bank accounts and loans to the various customers. It has several employees to manage its customers. It also operates number of branches. Also mark some appropriate weak entity sets.
- (b) Explain the concept of keys in DBMS. List and define each of them with suitable examples.
- (c) What is Data abstraction? Describe its various levels.
- (d) Explain the roles and responsibilities of a DBA.
- (e) Differentiate between Static and Dynamic hashing.
- (f) Compare DBMS with traditional File system.

2. Attempt any **Four** of the following questions: **3 x 4 = 12**

(a) Consider the following schema:

Branch(branch_name, branch_city, assets)

Customer(customer_name, customer_street, customer_city)

Loan(Loan_no, branch_name, amount)

Borrower(customer_name, loan_no)

Account(account_no, branch_name, balance)

Depositor(customer_name, account_no)

Give relational algebra or SQL expression for the following statements:

- (i) Find all loan numbers for loan made at the Lucknow branch with loan amounts greater than Rs. 10,000.
 - (ii) Find the customer names, loan numbers and loan accounts for all customers who have a loan from the bank.
 - (iii) Find the largest account balance in the bank.
- (b) Using the schema of Q.No.-2(a), give the relational algebra or SQL expressions for the following statements:
- (i) Give 5% increment to all the accounts whose balance is more than Rs. 1,000.
 - (ii) Find the branches where name start with 'A'.
 - (iii) Find all customers who have an account but no loan at the bank.
- (c) What are aggregate functions in SQL? Give examples.
- (d) Differentiate between Cartesian product and Natural join operations in relational algebra.
- (e) Explain Outer join operation in relational algebra.
- (f) What is Multivalued dependency?

3. Attempt any **Two** of the following questions: **6 x 2 = 12**

- (a) Consider a relation $R(ABCDEF)$ with the following functional dependencies: $A \rightarrow BC$, $A \rightarrow DEF$, $BC \rightarrow ADEF$, $B \rightarrow F$, $D \rightarrow E$:
- (i) Decompose the relation into 2NF.
 - (ii) Decompose the above obtained 2NF relations into 3NF.

- (b) A relation $R(ABCDE)$ with functional dependencies $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$ is decomposed into $R_1(ABC)$ and $R_2(ADE)$. Find:

- (i) The candidate key of R .
- (ii) Find whether the decomposition is lossless or lossy.

- (c) Consider a relation $R(ABC)$ with functional dependencies $F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$. Find:

- (i) The candidate key of R .
- (ii) The minimal cover with respect to F .

4. Attempt any **Two** of the following questions: **6 x 2 = 12**

- (a) What are *ACID* properties of transaction? Explain the usefulness of each by giving examples.
- (b) Which of the following schedules is conflict serializable? For each serializable schedule, determine the equivalent serial schedule:
- (i) $r_1(x); r_2(z); r_1(z); r_3(x); r_3(y); w_1(x); w_3(y); r_2(y); w_2(z); w_2(y)$.
 - (ii) $r_3(x); r_2(x); w_3(x); r_1(x); w_1(x)$.
- (c) Check whether the schedule is view serializable or not:

$w_3(z); R_2(x); w_2(y); R_1(z); w_3(y); w_1(y)$

5. Attempt any **Two** of the following questions: **6 x 2 = 12**

- (a) Explain how the two-phase Locking protocol ensures conflict serializability?
- (b) Briefly explain Timestamp-ordering protocol.
- (c) Explain how validation based Protocol can be used to control concurrency?

