DATA BASE MANAGEMENT SYSTEM AND COMPUTER NETWORKING
(CSEN 3205)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) A relation R(A,B,C,D) is decomposed into R1(A,B) and R2(A,C,D), where A is the candidate key of R1. So, the decomposition is
(a) lossy (b) is lossless
(c) both (a) and (b) (d) none of these.

(ii) Which of the following is not a proper state of transaction?
(a) Partially aborted (b) Partially committed
(c) Failed (d) Committed

(iii) The ability to modify the internal schema without causing any change to the external schema is
(a) physical data independence
(b) logical data dependence
(c) physical data dependence
(d) logical data independence.

(iv) Wait-die scheme for preventing deadlock is a
(a) pre-emptive scheme based on time-stamp
(b) non-pre-emptive scheme
(c) preemptive scheme
(d) non-preemptive scheme based on time-stamp.

(v) If a relation is in 2NF, then it can be in 3NF by removing
(a) repeating groups (b) partial dependencies
(c) transitive dependencies (d) overlapping dependencies.

(vi) TCL statements are
(a) create and drop (b) commit and rollback
(c) commit, rollback and save point (d) delete, insert.

(vii) The data encryption and decryption is the responsibility of which layer?
(a) Session layer (b) Application layer
(c) Transport layer (d) Presentation layer.

(viii) The physical layer is responsible for the transmission of which over the physical medium?
(a) Packet (b) Bits (c) Message (d) all of these.

(ix) Communication between a computer and a keyboard involves _____ transmission
(a) automatic (b) half-duplex
(c) full-duplex (d) simplex.

(x) A telephone network is an example of which type of network?
(a) Circuit-switched (b) Packet-switched
(c) Message-switched (d) none of these.

Group – B

2. (a) What are the different components of storage manager of DBMS? What role do they play and how?

(b) Explain with the help of appropriate diagram, the DBMS architecture in your lab. When you buy merchandise online from a web portal, what kind of DBMS architecture is working behind? Explain with proper diagram.

6 + (3 + 3) = 12

3. (a) Explain referential integrity, entity integrity and domain integrity with example.

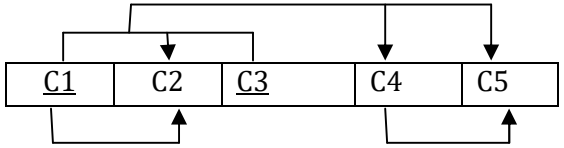
(b) A bank database has the following relations.
Account (*account–number, branch–name, balance),* Depositor *(customer–name, account–number),*
Customer *(customer–name, customer–street, customer–city),* Loan *(loan–number, branch–name, amount),*
Borrower *(customer_name, loan_number),* Branch *(branch–name, branch–city, assets)*
Write the relational algebra for the following queries.
(i) Find the largest account balance in the bank
(ii) Find the names of all customers who have a loan at the Kolkata branch.
(iii) Find all customers who have both loan and account.

4 + 8 = 12

Group – C

4. (a) What is data redundancy and data inconsistency? Explain with a proper example.

   (b) Given the dependency diagram shown in the following figure, (the primary key attributes are underlined).



   (i) Identify and discuss each of the indicated dependencies.
   (ii) Create a database whose tables are at least in 3NF, showing dependency diagram for each table.

(2 + 2) + (4 + 4) = 12

5. (a) Consider the three transactions : T1, T2 and T3 and the schedules S_1 and S_2 given below. Draw the precedence graphs for S_1 and S_2, and determine whether each schedule is serializable or not.
T_1: $r_1(X)$; $r_1(Z)$; $w_1(X)$;
T_2 : $r_2(Z)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;
T_3 : $r_3(X)$; $r_3(Y)$; $w_3(Y)$;
S_1 : $r_1(X)$; $r_2(Z)$; $r_1(Z)$; $r_3(X)$; $r_3(Y)$; $w_1(X)$; $w_3(Y)$; $r_2(Y)$; $w_2(Z)$; $w_2(Y)$;
S_2: $r_1(X)$; $r_2(Z)$; $r_3(X)$; $r_1(Z)$; $r_2(Y)$; $r_3(Y)$; $w_1(X)$; $w_2(Z)$; $w_3(Y)$; $w_2(Y)$;

   (b) Describe wait-die and wait-wound protocol for deadlock prevention.

6 + 6 = 12

Group – D

6. (a) Given an IP address 192.168.67.3. Determine the class to which it belongs. Also determine the net mask, network and broadcast address.

   (b) What do you mean by switching? What are the differences between packet switching and circuit switching?

6 + (1 + 5) = 12

7. (a) Give the functions of data link layer in the OSImodel.

   (b) What is domain name server? Specify the components defined by a URL. What is the difference between static and dynamic documents?

4 + (3 + 3 + 2) = 12

Group – E

8. (a) While we surf the WWW, what roles do DNS server and proxy server play?

   (b) Explain, with diagram, step by step, how a search engine works. Why Google is so special among all the search engines?

(2 + 2) + (6 + 2) = 12

9. (a) Name some protocols of network layer and of transport layer of OSI model.

   (b) Explain with proper diagram how telnet works over the Internet?

6 + 6 = 12