RDBMS CONCEPT AND COMPUTER NETWORKING
(CSE2207)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) In an ER diagram rectangle represents
(a) attribute (b) entity
(c) relationship (d) key

(ii) The level of data abstraction which describes how the data is actually stored is
(a) physical level (b) storage level
(c) conceptual level (d) view level

(iii) Which operation is NOT primitive in relational algebra?
(a) Selection (b) Projection
(c) Join (d) Cartesian Product

(iv) Every table in BCNF is also in
(a) 3NF (b) 2NF (c) 1NF (d) All of the above

(v) In a relation R(A, B, C, D), if A → B, B → C, and C → D, then which of the following is TRUE?
(a) C is not dependent on A (b) B is a candidate key
(c) A is a superkey (d) D is functionally dependent on B only

(vi) A table that is in 2NF but not in 3NF must have:
(a) A composite key (b) A partial dependency
(c) A transitive dependency (d) A candidate key with multiple attributes

(vii) How many layers are there in the ISO OSI reference model?
(a) 7 (b) 5 (c) 4 (d) 6

(viii) Which one of the following is not a function of network layer?
(a) Congestion Control (b) Error Control
(c) Routing (d) Inter Networking

(ix) Which of the following allows you to connect and login to a remote computer?
(a) SMTP (b) HTTP (c) FTP (d) Telnet

(x) Data fragmentation in distributed databases refers to
(a) Data duplication (b) Dividing a database into smaller pieces
(c) Deleting unwanted data (d) Encrypting data

Fill in the blanks with the correct word

(xi) An attribute of one table matching the primary key of another table is called _____.

(xii) _____ ACID property ensures that the database remains consistent even after system failure.

(xiii) _____ network topology requires a central controller or hub.

(xiv) _____ is a protocol that allows to send/upload email message from local computer to an email server.

(xv) Serializability is used to ensure _____ in concurrent transaction execution.

Group - B

2. (a) In the state of West Bengal, the state government wishes to build a DBMS for tourism department. The information consists of monuments of tourist interest, their location and history. Monuments are classified according to historical, religious and architectural importance.
The list of facilities available at each spot is
(i) Living accommodation in terms of hotels, their names, category and the number of rooms available.
(ii) Local transport facilities in terms of service provider name, tours with their tariff and timing.
Draw an ER diagram by identifying the entities, relationships, attributes, and keys.
[(CO2)(Analyse/HOCQ)]

(b) Define the entity type, entity set, relationship type and relationship instance with example in the context of DBMS. *[(CO1)(Remember/LOCQ)]*

8 + 4 = 12

3. (a) Consider the following relational database
employee (person name, street, city)
works (person name, company name, salary)
company (company name, city)
Give an expression in the relational algebra to express each of the following queries:
a. Find the names of all employees who live in city "Kolkata".
b. Find the names of all employees whose salary is greater than Rs 100,00.
c. Find the names of all employees who live in "Kolkata" and whose salary is greater than Rs100,00. *[(CO3)(Apply/IOCQ)]*

(b) Consider the following insurance database
person (driver id, name, address)
car (license, model, year)
accident (report number, date, location)
owns (driver id, license)
participated (report number, license, driver id, damage amount)

The primary keys are underlined.

Construct the following SQL queries for this relational database.

a. Find the total number of people who owned cars that were involved in accidents in 2009.
b. Find the number of accidents in which the cars belonging to "Rahul Kumar" were involved.
c. Update the damage amount for the car with the license number "AABB2000" in the accident with report number "AR2197" to Rs 3000. *[(CO3)(Apply/IOCQ)]*

(2 × 3) + (2 × 3) = 12

Group - C

4. (a) What is serializable schedule? Explain with example. *[(CO4)(Understand/LOCQ)]*

(b) Consider the following two transactions:

```
T1: read(A);
    read(B);
    if A = 0 then B := B + 1;
    write(B).
T2: read(B);
    read(A);
    if B = 0 then A := A + 1;
    write(A).
```

Let the consistency requirement be $A = 0 \vee B = 0$, with $A = B = 0$ the initial values.

(i) Show that every serial execution involving these two transactions preserves the consistency of the database.

(ii) Show a concurrent execution of T1 and T2 that produces a nonserializable schedule.

(iii) Is there a concurrent execution of T1 and T2 that produces a serializable schedule? *[(CO4)(Apply/IOCQ)]*

3 + (3 + 3 + 3) = 12

5. (a) A table has two columns out of them one is a primary key. Prove that the table satisfies all the normal forms. *[(CO2)(Analyse/HOCQ)]*

(b) What do you mean by Lossless-Join Decomposition and Dependency Preservation in RDBMS? Explain each of them with example. *[(CO2)(Understand/LOCQ)]*

6 + (3 + 3) = 12

Group - D

6. (a) Construct the Hamming code for the bit sequence 1001101. *[(CO5)(Create/HOCQ)]*

(b) How does a single-bit error differ from a burst error? *[(CO5)(Analyze/IOCQ)]*

(c) Describe the Piggybacking? *[(CO5)(Remember/LOCQ)]*

6 + 3 + 3 = 12

7. (a) Write down the advantages of mesh and star topology. *[(CO5)(Remember/LOCQ)]*

(b) What are the functions provided by physical link layer and network layer in the OSI model? *[(CO5)(Remember/LOCQ)]*

(c) Given an IP address 130.34.54.12. Find the class of the given IP address in classful addressing scheme. Also find the netmask of that class and determine the net id and host id. *[(CO5)(Apply/IOCQ)]*

(2 + 2) + (2 + 2) + (1 + 1 + 1 + 1) = 12

Group - E

8. (a) Explain the role of DNS server and Proxy server in the context of World Wide Web. *[(CO6)(Remember/LOCQ)]*

(b) Explain, with diagram, the working principle of a search engine. *[(CO6)(Apply/IOCQ)]*

(3 + 3) + 6 = 12

9. (a) What is Distributed database? What are the advantages of distributed database over centralized. *[(CO6)(Remember/LOCQ)]*

(b) You want to access your college website - www.heritageit.edu. You typed the URL address in your browser. Explain step by step, how your request will be eventually served by the web server hosting your college website. *[(CO6)(Analyze/IOCQ)]*

(2 + 3) + 7 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	39.6	39.6	20.8