RDBMS CONCEPT AND COMPUTER NETWORKING
(CSEN 3207)

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

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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 functional dependency X->Y means that association from the domain of X to domain of Y is
    (a) many to many   (b) one to many
    (c) many to one   (d) one to one.

    (ii) If a schedule S can be transformed into a schedule S' by a series of swaps of non-conflicting instructions, we say that S and S' are:
    (a) Conflict Serializable   (b) View equivalent
    (c) Conflict Equivalent   (d) View Serializable.

    (iii) Relation R = (A, B, C, D) with AB as primary key. Choose one functional dependency such that R should be in 1NF but not in 2NF.
    (a) AB -> C   (b) AB -> D
    (c) A -> D   (d) AB -> CD.

    (iv) 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.

    (v)   Flow control is the responsibility of _____
    (a) Data Link layer   (b) Network layer
    (c) Application layer   (d) Transport layer.

    (vi) Which topology requires a central controller or hub?
    (a) Mesh   (b) Star
    (c) Bus   (d) Ring

    (vii) 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.

(viii) Which of the following is an application layer service?
(a) FTP   (b) Remote login
(c) eMail services   (d) All of these.

(ix) One limitation of E-R model is that it cannot _____
(a) Use generalization
(b) Use single primary key
(c) Express relationship among relationships
(d) None of the above.

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

Group - B

2. (a) Discuss the advantages of Database System over File processing system. Explain physical and logical independence with respect to RDBMS.
   [(CO1)(Remember/LOCQ)]

   (b) Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars, and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received. *[(CO2)(Apply/HOCQ)]*
   (2 + 2) + 8 = 12

3. (a) Site an example of Weak Entity Set and its identifying relationship with a strong entity set by using ER-notation. *[(CO2)(Remember/LOCQ)]*

   (b) Consider a relational database as given below:
   Train (<u>train-no</u>, train_name, start_station)
   Coach(<u>coach-no, train-no</u>, type, price)
   where the underlined attributes are the primary keys. Write down the SQL statement for the following queries:
   (i) List all the train names starting from station XYZ.
   (ii) List the train number and price of all "3 A/C" (type) coaches with price below 3025/-.
   (iii) List the price and type of all coaches of "Duronta Express" train.
   [(CO3)(Apply/HOCQ)]
   3 + (3 + 3 + 3) = 12

Group - C

4. (a) "A candidate key is minimal superkey". Explain with example.
   [(CO2)(Analyse/IOCQ)]

    (b)   What is the difference between 3NF and BCNF?   *[(CO2)(Remember/LOCQ)]*

    (c)   Given the dependency diagram shown in the following figure:
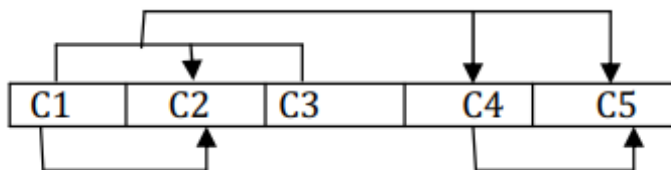
        Create a database whose tables are at least in 3NF, showing dependency diagram for each table.   *[(CO2)(Analyse/IOCQ)]*

        3 + 3 + 6 = 12

5.   (a)   What is a transaction? Write ACID properties of transaction.

        [(CO4)(Understand/LOCQ)]

    (b)   Which of the following schedule is conflict serializable? Explain your answer. For each serializable schedule, determine the equivalent serial schedule.

        (i) $r1(x); r3(x); w1(x); r2(x); w3(x);$

        (ii) $r3(x); r2(x); w3(x); r1(x); w1(x).$ *[(CO4)(Analyze/IOCQ)]*

        (2 + 4) + (3 + 3) = 12

Group - D

6.   (a)   What are the differences between OSI and TCP/IP model? What is switching? Differentiate between Packet Switching and Circuit switching.

        [(CO5)(Remember/LOCQ)]

    (b)   Explain with appropriate diagrams the different modes of data transmission. Explain briefly Ring, Star and Mesh topologies.   *[(CO5)(Understand/LOCQ)]*

        (2 + 1 + 3) + (3 + 3) = 12

7.   (a)   An organization needs a total of 15 subnets divided into following blocks:-

        2 subnets each with 128 addresses

        2 subnets each with 64 addresses

        2 subnets each with 32 addresses

        3 subnets each with 16 addresses

        3 subnets each with 8 addresses

        3 subnets each with 4 addresses

        An ISP provides a network address 172.16.2.0/22, to the organization. Design the subnets.

        Find out how many addresses are still available after this allocation.

        [(CO5)(Apply/HOCQ)]

    (b)   Explain Border Gateway Protocol (Network Layer protocol) in detail.

        [(CO5)(Remember/LOCQ)]

        (6 + 2) + 4 = 12

Group - E

8. (a) Explain domain name system with example. Specify the components defined by a URL.   *[(CO6)(Remember/LOCQ)]*
    (b) Explain briefly POP3, IMAP and SMTP protocols.   *[(CO6)(Understand/LOCQ)]*

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

9. (a) Explain the working principle of HTTP in detail with HTTP REQUEST and HTTP RESPONSE format.   *[(CO6)(Remember/LOCQ)]*
    (b) Explain the importance of WWW and its underlying infrastructure (Internet) in details.   *[(CO6)(Understand/LOCQ)]*

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	58.33	15.63	26.04

Course Outcome (CO):

After the completion of the course students will be able to
1. Identify the characteristics of a database and describe the architecture and languages of relational Database Management System.
2. Understand & analyze design principles for logical design of databases, including the E-R model and apply the concepts of normalization to design an optimal database.
3. Apply relational database theory, and be able to write relational algebra expressions for queries and apply the concepts to manage a database using SQL.
4. Understand the concept of database transaction, it's properties and the concept called serializability.
5. Understand the topology, transmission mode of computer networks and explains key networking protocols in the context of a conceptual model, such as the OSI and TCP/IP framework.
6. Understand the basic workings of Inter networking, WWW, search engine and e-mail in the context of data communication.

LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.