



BRAINWARE UNIVERSITY

Course – MCA

DBMS – MCA 303

(Semester – 3)

Time allotted: 3 Hours

Full Marks : 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)

10 x 1 = 10

1. *Choose the correct alternative from the following*
 - (i) The rule that a value of a foreign key must appear as a value of some specific table is called a
 - a. Index
 - b. Referential constraint
 - c. Integrity constraint
 - d. Functional dependency
 - (ii) Let $R(A,B,C)$ be a relation with FDs $\{A \rightarrow B\}$. The candidate key of the above relation is:
 - a. $\{ABC\}$
 - b. $\{AC\}$
 - c. $\{AB\}$
 - d. $\{A\}$
 - (iii) A table can have only one
 - a. Primary key
 - b. Superkey
 - c. Candidate key
 - d. Alternate key
 - (iv) The information about data in a database is called
 - a. Metadata
 - b. Teradata
 - c. Hyperdata
 - d. None of these
 - (v) In an E-R diagram, diamond represents
 - a. Entity
 - b. Attribute
 - c. Relationship
 - d. Discriminator

- (vi) Relational algebra is
- Procedural language
 - Non-procedural language
 - Structured query language
 - None of these
- (vii) A normal form in which every determinant is a key is
- 2NF
 - 3NF
 - BCNF
 - 4NF
- (viii) Consider three transactions T1,T2 and T3 having 2,3 and 4 operations respectively. The total number of concurrent schedules are
- 6
 - 1260
 - 1254
 - None of these
- (ix) Which of the following is not a DDL statement?
- ALTER
 - DROP
 - CREATE
 - SELECT
- (x) Which of the following is the way to undo the effects of an aborted transaction?
- Compensation transaction
 - Rollback
 - Recovery
 - Error Control

Group – B

(Short Answer Type Question)

3 x 5 = 15

Answer any *three* from the following

- What do you mean by HDBMS and NDBMS? What are the disadvantages of these two systems? [3+2]
- Explain super key, candidate key, primary key, alternate or secondary key, foreign key with suitable example. [5]
- Describe Entity Integrity and Referential Integrity Constraints. Why each is considered to be important? Explain with suitable examples. [5]
- Consider relation R(A,B,C) and a set of functional dependencies $F = \{ A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C \}$
Compute the canonical cover for F. [5]
- Explain various types of JOIN operations with suitable examples. [5]

Group – C

(Long Answer Type Question)

3 x 15 = 45

Answer any *three* from the following

7. (a) Suppose you are given the following requirements for a simple database for the Indian Premier League (IPL):
- the IPL has many teams,
 - each team has a name, a city, a coach, a captain, and a set of players,
 - each player belongs to only one team,
 - each player has a name, a position (such as wicket keeper, batsman etc), a skill level, and a set of injury records,
 - a team captain is also a player,
 - a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 18th, 2017) and a score (such as 200 runs).
- Construct a clean and concise ER diagram for the IPL database. [10]
- (b) Describe three level of abstractions of DBMS and also explain the mappings between such levels. [5]
8. (a) Consider the following relations:
 Employee (ename,street,city)
 Works(ename,Cname,salary)
 Company(Cname,city)
 Managers(ename,mgr_name)
 Perform the following queries as directed within the bracket:
 (i) Find the name(s) and cities of all employees who work for 'IBM' company (Relational Algebra).
 (ii) Find all employees who live in the same cities as the companies for which they work (SQL).
 (iii) Find the second highest salary (SQL).
 (iv) Find all employees who do not work for 'IBM' company (Relational Algebra). [4x3]
- (b) Explain aggregation with a suitable example. [3]
9. (a) Suppose you are given a relation $R(A,B,C,D,E,F,G)$ with the set of functional dependencies $F=\{A \rightarrow DE, AB \rightarrow C, B \rightarrow F, F \rightarrow G\}$. Decompose it up to BCNF. [4]

- (b) Prove that a relation with primary key of single attribute is always in 2NF. [2]
- (c) Differentiate between:
(i) Weak Entity and Strong Entity.
(ii) Disjoint subclass and Overlapping subclass.
(iii) Multivalued attribute and Composite attribute. [2+2+1]
- (d) Explain Two phase locking protocol. [4]
10. (a) Construct a B+ tree (order 3) with the following key values:
8,1,5,3,7,20,9,6,12,4 [5]
- (b) Consider the file with $r=30000$ records(fixed length) of size $R=100$ bytes stored on a disk with block size $B=1024$ bytes. Suppose each index entry in index file takes 15 (9 bytes for index value, 5 bytes for pointer) bytes. What is the number of accessing blocks for clustering index? [7]
- (c) Differentiate between Sparse index and Dense index. [3]
11. Write short notes on any three of the following: [3x5]
- (a) Lossless decomposition.
(b) View serializability.
(c) Cursor in SQL.
(d) Division operator in relational algebra.
(e) ACID property in transaction.