18250

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – MCA-2025
Course Name – Database Management System
Course Code - MCA17404 (T)
(Semester I)

Full Marks : 40 **Time : 2:0 Hours**

[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) 1 x 10=10

1. *Choose the correct alternative from the following :*

(i) Which command is used to modify data in a table?

a) INSERT b) DELETE
c) UPDATE d) SELECT

(ii) What do you mean by a tuple in a Relational Database?

a) A column b) A row
c) A table d) A database

(iii) In the relation R(StudentID, Name, Course, Instructor) with the functional dependencies: StudentID → Name, Course → Instructor Which of the following is the primary key of relation R?

a) StudentID, Course b) StudentID
c) Course d) Instructor

(iv) In a schema with attributes A,B, C, D and E, the following set of dependencies are given {A -> B, A -> C, CD -> E, B -> D, E-> A} Which of the following functional dependencies is not implied by the above set?

a) CD -> AC b) BD -> CD
c) BC -> CD d) AC -> BC

(v) Consider a relation R(ABCDEF) and the functional dependencies {A -> B, C -> D , E -> F}. Which of the following is the candidate key?

a) AB b) BCD
c) ACE d) BD

(vi) Which of the following best explains the role of a weak entity in an ER model?

a) It can exist independently without any relationship b) It has a unique key of its own
c) It depends on a strong entity and lacks a primary key d) It cannot participate in any relationship

(vii) Consider a Join of a relation R with a relation S. If R has m Tuple and S has n Tuples, then the maximun and minimum size of the join respectevely are -

a) m + n , 0
b) mn , 0
c) m + n , m - n
d) mn , m + n

(viii) Which of the following best explains the purpose of normalization in a database?

a) Organizing data to reduce redundancy
b) Increasing data redundancy
c) Encrypting the data
d) Archiving data

(ix) Which of the following statements correctly compares heap and sequential files?

a) Heap files are faster for sorted range queries than sequential files
b) Heap files always require indexing
c) Sequential files maintain order based on a field, whereas heap files do not
d) Sequential files are always used in NoSQL systems

(x) What is a key function of the Global Query Optimizer in a DDBMS?

a) Encrypting remote data
b) Determining the fastest way to execute a distributed query
c) Managing local disk storage
d) Compiling SQL into machine code

Group-B

(Short Answer Type Questions) 3 x 5=15

2. An e-commerce application is expanding globally. Evaluate whether a distributed database or an object-oriented database would better support its requirements for speed, reliability, and complex data structures. (3)
3. Consider a Relation R(A,B,C,D,E,F,G,H,I, J) and the Functional Dependencies are {AB -> C, BD -> EF, AD -> GH, A -> I, H ->J }. Decompose R into 2nd normal from (2NF) (3)
4. Consider a relation R (A, B, C) with functional dependencies {A -> B , B -> C , C -> A} . R is decomposed into R1 (AB) and R2 (BC), then show i) Decomposition is lossless ii) Decomposition is dependency preserving. (3)
5. Minimize the functional dependencies {A -> B , C -> B , D -> ABC , AC -> D} (3)
6. Given a system prone to frequent deadlocks due to concurrent long-running transactions, evaluate different deadlock prevention strategies. Which one would you recommend and why? (3)

OR

(3)

Given schedule S:

T1	T2	T3
R(X)		
	R(Y),	
		R(Y)
	W(Y)	
W(X)		
		W(X)
	R(X)	
	W(X)	

Analyze serializability and give an equivalent serial order if possible.

Group-C

(Long Answer Type Questions) 5 x 3=15

7. Explain three layers of architecture of DBMS and also define physical data independance and logical data independence. (5)

8. Analyse how locking protocols prevent lost updates in concurrent transaction execution in database systems. Explain with suitable examples. (5)
9. Explain semi join operation with example. Why it is different form regular join operation? (5)

OR

Explain horizontal and vertical fragmentation with example. (5)

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