

Enrollment No.....



Faculty of Engineering  
End Sem Examination May-2023

CS3CO39 / CS3CO25 Database Management Systems  
Programme: B.Tech. Branch/Specialisation: CSE All

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. What is information about data called? 1  
 (a) Hyper data (b) Tera data  
 (c) Meta data (d) Relations
- ii. Which of the following is known as a set of entities of the same type that share same properties, or attributes? 1  
 (a) Relation set (b) Tuples  
 (c) Entity set (d) Entity Relation model
- iii. What does an RDBMS consist of? 1  
 (a) Collection of Records (b) Collection of Keys  
 (c) Collection of Tables (d) Collection of Fields
- iv. Which command is used to remove a relation from an SQL? 1  
 (a) Drop table (b) Delete (c) Purge (d) Remove
- v. Third normal form is based on the concept of \_\_\_\_\_. 1  
 (a) Closure Dependency (b) Transitive Dependency  
 (c) Normal Dependency (d) Functional Dependency
- vi. Consider a relation R(A, B, C, D) with the following functional dependencies: 1  
 $A \rightarrow (B, C, D)$ ,  $(A, D) \rightarrow (B, C)$  and  $(C, D) \rightarrow (A, B)$ .  
 What is/are the candidate key(s)?  
 (a) (A, CD) (b) (AC, A) (c) (CD, BCD) (d) None of these
- vii. As part of concurrency control protocols, the concurrent execution of database transactions will be \_\_\_\_\_, durable, and serializable. 1  
 (a) Atomic (b) Consistent (c) Isolated (d) All of these

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- viii. A transaction completes its execution is said to be \_\_\_\_\_. **1**  
 (a) Commit (b) Rollback (c) Backup (d) None of these
- ix. Which of the following are steps in query processing? **1**  
 (a) Parsing and translation (b) Optimization  
 (c) Evaluation (d) All of these
- x. What is the purpose of index in sql server? **1**  
 (a) To enhance the query performance  
 (b) To provide an index to a record  
 (c) To perform fast searches  
 (d) All of these
- Q.2 i. What do you mean by DBMS? Also mention its applications. **2**  
 ii. What are the main differences between a file processing system and a DBMS? **3**  
 iii. Discuss the three-level architecture of database system. **5**
- OR iv. Explain the concept of specialization and generalization with respect to database and also draw the E-R diagram for the same. **5**
- Q.3 i. What do you understand by cursor? Explain with suitable example. **2**  
 ii. Explain at least 4 DDL & 4 DML commands along with syntax and example. **8**
- OR iii. Consider the relational database given below: **8**  
 employee (person-name, street, city)  
 works (person-name, company-name, salary)  
 company (company-name, city)  
 manages (person-name, manager-name)  
 Give an expression in the relational algebra to express each of the following queries:  
 (a) Find the names of all employees who work for First Bank Corporation.  
 (b) Find the names and cities of residence of all employees who work for First Bank Corporation.  
 (c) Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than \$10,000 per annum.  
 (d) Find the names of all employees in this database who live in the same city as the company for which they work.

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- Q.4 i. What is Normalization? What are the advantages of Normalization? **3**  
 ii. Explain the different normal forms with suitable examples? **7**
- OR iii. Consider a relation R(A, B,C,D,E) with the following functional dependencies is given:  $A \rightarrow B$ ,  $C \rightarrow B$ ,  $B \rightarrow E$ ,  $E \rightarrow D$  and decomposition of R into R1(A,B,C) and R2(B,D,E). **7**  
 (a) Does this decomposition have the lossless join property? Is it possible to reconstruct R from R1 and R2 using Natural Join? Give reason for your answer?  
 (b) What is/are the candidate key(s) of R?
- Q.5 i. What is Transaction Processing System? Also explain the commands used in Transaction Control Language. **4**  
 ii. What do you Understand by ACID properties? Explain the different states of transaction with suitable diagram. **6**
- OR iii. Explain these two: **6**  
 (a) Locking Protocols,  
 (b) Conflict and View serializability.
- Q.6 Attempt any two:  
 i. Describe data warehousing and also explain the data mining steps. **5**  
 ii. What do you understand by distributed databases, web and mobile database? **5**  
 iii. What are the different steps involved in query processing and optimization? Explain in detail. **5**

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## Marking Scheme

### CS3CO39[T]-Data Base Management Systems

Q.1	i)	What is information about data called? <b>c) Meta data</b>	1
	ii)	Which of the following is known as a set of entities of the same type that share same properties, or attributes? <b>c) Entity set</b>	1
	iii)	What does an RDBMS consist of? <b>c) Collection of Tables</b>	1
	iv)	Which command is used to remove a relation from an SQL? <b>a) Drop table</b>	1
	v)	Third normal form is based on the concept of _____ <b>b) Transitive Dependency</b>	1
	vi)	Consider a relation R(A, B, C, D) with the following functional dependencies: $A \rightarrow (B, C, D)$ , $(A, D) \rightarrow (B, C)$ and $(C, D) \rightarrow (A, B)$ . What is/are the candidate key(s). <b>a) (A, CD)</b>	1
	vii)	As part of concurrency control protocols, the concurrent execution of database transactions will be ____, durable, and serializable. <b>d) All of the above</b>	1
	viii)	A transaction completes its execution is said to be _____ <b>a) Commit</b>	1
	ix)	Which of the following are steps in query processing? <b>d) All of the mentioned</b>	1
	x)	What is the purpose of index in sql server <b>d) All of the mentioned</b>	1
Q.2	i.	What do you mean by DBMS? <b>(1 mark)</b> Also mention its applications. <b>(1 mark)</b>	2
	ii.	What are the main differences between a file processing system and a DBMS? <b>(6 differences ,0.5 marks each)</b>	3
	iii.	Discuss the three-level architecture of database system. <b>( Diagram 2 marks, explanation 3 marks)</b>	5
OR	iv.	Explain the concept of specialization and generalization with respect to database and also draw the E-R diagram for the same. <b>(Explanation 3 marks, E-R diagram 2 marks)</b>	5

Q.3	i.	What is Cursor with example? <b>(Definition 1 mark, example 1 mark)</b>	2
	ii.	Describe data manipulation (DML) and data definition languages (DDL) commands with syntax and suitable examples? <b>(DDL 4 marks, DML 4 marks)</b>	8
OR	iii.	Consider the relational database given below: employee (person-name, street, city) works (person-name, company-name, salary) company (company-name, city) manages (person-name, manager-name) Give an expression in the relational algebra to express each of the following queries: a. Find the names of all employees who work for First Bank Corporation. b. Find the names and cities of residence of all employees who work for First Bank Corporation. c. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than \$10,000 per annum. d. Find the names of all employees in this database who live in the same city as the company for which they work. <b>(2 marks for each query)</b>	8
Q.4	i.	What is Normalization? <b>(2 mark)</b> What are the advantages of Normalization? <b>(1 mark)</b>	3
	ii.	Explain the different normal forms with suitable examples?	7
OR	iii.	Consider a relation R(A, B,C,D,E) with the following functional dependencies is given: $A \rightarrow B$ , $C \rightarrow B$ , $B \rightarrow E$ , $E \rightarrow D$ and decomposition of R into R1(A,B,C) and R2(B,D,E). a) Does this decomposition have the lossless join property? Is it possible to reconstruct R from R1 and R2 using Natural Join? Give reason for you answer? <b>(4 marks)</b> b) What is/are the candidate key(s) of R? <b>(3 marks)</b>	7
Q.5	i.	What is Transaction Processing System? <b>(2 marks)</b> Also explain the commands used in Transaction Control Language. <b>(2 marks)</b>	4
	ii.	What do you Understand by ACID properties? <b>(3 marks)</b> Explain the different states of transaction with suitable diagram? .	6

OR	<b>(3 marks)</b>		<b>6</b>
	iii.	Explain these two: 1. Locking Protocols. <b>(3 marks)</b> 2. Conflict and View serializability. <b>(3 marks)</b>	
Q.6	Attempt any two:		
	i.	Describe data warehousing and data mining?	<b>5</b>
	ii.	What do you understand by distributed databases (2.5 marks) web and mobile database ? <b>(2.5 marks)</b>	<b>5</b>
	iii.	What are the different steps involved in query processing and optimization? Explain in detail? <b>(5 marks)</b>	<b>5</b>

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(iii)

1) a  $\pi_{e.\text{person-name}} (\sigma_{w.\text{company-name} = \text{First Bank}} (e \bowtie w))$  (2)

2) b  $\pi_{e.\text{person-name}} \wedge e.\text{city} (\sigma_{w.\text{company-name} = \text{First Bank}} (e \bowtie w))$

3)  $\pi_{e.\text{person-names} \wedge e.\text{street} \wedge e.\text{city}} (\sigma_{w.\text{company-name} = \text{First Bank} \wedge w.\text{salary} > \$10000} (e \bowtie w))$

4) d  $\pi_{e.\text{person-name}} (\sigma_{e.\text{city} = w.\text{city}} (e \bowtie w)) (e \bowtie c)$

Q 4. (iii) (a) yes - Natural Join

- ①  $R_1 \cup R_2 = R$
- ②  $R_1 \cap R_2 \neq \emptyset$
- ③ C.A. should be the C.K or S.K of either  $R_1, R_2$  or  $R$ .

candidate key is

$A^* \rightarrow AB$   
 $\rightarrow ABE$   
 $\rightarrow ABDE$

$B^* \rightarrow BE$   
 $\rightarrow BDE$

$C^* \rightarrow CB$

$A^* \rightarrow AC$

$\rightarrow ABC$

$\rightarrow ABCE$

$\rightarrow \underline{ABCDE}$

$AB^* \rightarrow AB$

$\rightarrow ABE$

$\rightarrow \underline{ABDE}$

AC

(BT)

~~Q2 (iii)~~

Q1

(i) C meta data

(ii) C Entity set

(iii) C collection of table

(iv) A Drop table

(v) B Transitive ~~is~~ Dependency

(vi) A  $(A, CD) \rightarrow \begin{cases} A \rightarrow B, C, D \\ AD \rightarrow B, C \end{cases}$

(vii) D All of these  $CD \rightarrow AB$

(viii) A  $A \rightarrow ABCD \checkmark$  CK.

(ix) D  $CD \rightarrow CDAB \checkmark$  CK.

(x) D All of these

