Hall Ticket Number:

CS/IT223(R18)

B.TECH. DEGREE EXAMINATION, NOVEMBER-2020

Semester IV [Second Year] (Regular)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours | Maximum Marks: 60

Answer Question No.1 compulsorily. (12 x 1 = 12)
Answer One Question from each unit. (4 x 12 = 48)

1. Answer the following:
   (a) Explain the different database users. CO1
   (b) List the different types of attributes with examples. CO1
   (c) What is the role of a Database Administrator? CO1
   (d) What restrictions are necessary to ensure that view is updatable? CO2
   (e) What is an SQL query block? Describe how a query block is translated into extended relational algebra? CO2
   (f) List different aggregate functions in SQL. CO2
   (g) Define functional dependencies. CO3
   (h) What are the phases are involved in the Database Development process? CO3
   (i) Define PJNF. CO3
   (j) Write an example schedule where the transactions are in deadlock. CO4
   (k) Write the syntax for the GRANT command in SQL. CO4
   (l) Write about Mandatory Access Control. CO4

UNIT – I

2. (a) Discuss various categories of data models with suitable examples. (6M) CO1
   (b) How to convert a weak entity set into a strong entity set? Outline what sort of redundancy will result if we convert a weak entity set into a strong entity set. (6M) CO1

(OR)

3. A college runs many evening classes (e.g. computers, electronics, science, maths). Each class may be taught by several teachers, and a teacher may teach several classes. A particular class always uses the same room (e.g. computers, always uses room R101). Because classes may meet at different times or on different evenings different classes can share a room (e.g. computers and art both use room R101). Draw an entity-relationship diagram. List all relation schemes. For each relation scheme, identify the primary key and the foreign key. CO1

UNIT – II

4. For each of the following *TRC* queries, write the corresponding query in *relational algebra* and *SQL*?
   (i) $\{e.Date \mid Enroll(e) \wedge (\exists c)(Course(c) \wedge e.Dept = c.Dept \wedge e.ENum = c.Num \wedge c.Title = \text{'Database Design'})\}$
   (ii) $\{s.ID \mid Student(s) \wedge s.Major = \text{'MATH'} \wedge (\exists e)(Enroll(e) \wedge s.ID = e.SID \wedge (\exists c)(Course(c) \wedge e.Dept = c.Dept \wedge e.ENum = c.Num \wedge c.Title = \text{'Discrete Structures'}))\}$. CO2

(OR)

5. (a) Express the following operations in terms of fundamental relational algebra operations:
   (i) Theta Join (ii) Intersection (iii) Division. (6M) CO2
   (b) What is the difference between Count, Count DISTINCT and Count (*) in SQL? When will these three commands generate the same and different results? (6M) CO2

UNIT – III

6. (a) Describe a situation in which projection should precede selection in processing a project-select query and describe a situation where the opposite processing order is better. (Assume that duplicate elimination for projection is done via sorting.) (6M) CO3
   (b) *R (A, B, C, D, E), A → D, B → E, DE → C. Let S (A, B, C)* be a decomposed relation of R. What functional dependencies hold on S? (6M) CO3

(OR)

7. (a) Assume the following set of functional dependencies hold for the relation
   R (A, B, C, D, E, F): A→BC, C→E, B→D.
   Is it in BCNF? Explain. If it is not, normalize it into a set of relations in BCNF. (6M) CO3
   (b) Design an algorithm to find closure of attributes in a given relation. Illustrate with an example. (6M) CO3

UNIT – IV

8. (a) Draw a state diagram with all possible sequences of states through which a transaction may pass. (6M) CO4
   (b) Give a method for testing conflict serializability of a schedule and illustrate with an example. (6M) CO4

(OR)

9. (a) What is the locking protocol? Describe the 2-phase locking protocol. (6M) CO4
   (b) Explain the purpose of the checkpoint mechanism with an example. How does the frequency of checkpoints affect the time it takes to recover from a disk crash? (6M) CO4

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9. (a) What is a checkpoint? Explain the purpose of the checkpoint mechanism with an example. (6M) CO4
(b) What is the difference between a database crash and a media failure? Explain. (6M) CO4

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B.TECH. DEGREE EXAMINATION, JANUARY-2021

Semester IV [Second Year] (Supplementary)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours Maximum Marks: 60

Answer Question No.1 compulsorily. (12 x 1 = 12)
Answer One Question from each unit. (4 x 12 = 48)

1. Answer the following:
(a) Why do we need mappings between schema levels in a three-level schema? CO1
(b) Define Data Independence. CO1
(c) Mention any three situations where the weak entity will occur. CO1
(d) List the advantages of views. CO2
(e) How do you create a trigger in SQL? CO2
(f) Compare a candidate key with a super key. CO2
(g) List different types of outer-join operations and their representations in relational algebra. CO3
(h) What is join dependency? CO3
(i) How many ways are possible to implement the SET operations? CO3
(j) Explain the salient differences between conflict serializable schedule and view serializable schedule. CO4
(k) Write the syntax for the REVOKE command in SQL. CO4
(l) What is thrashing? What should a DBA do if the system crashes? CO4

UNIT – I

2. (a) What is the difference between logical data independence and physical data independence? Which one is harder to achieve? (6M) CO1

(b) What are the advantages of Database management systems? Explain. (6M) CO1

(OR)

3. Consider a MAIL_ORDER database in which employees take orders for parts from customers. The data requirements are summarized as follows: The mail-order company has employees, each identified by a unique employee number, first and last name, and Zip Code. Each customer of the company is identified by a unique customer number, first and last name, and Zip Code. Each part sold by the company is identified by a unique part number, a part name, price, and quantity in stock. Each order placed by a customer is taken by an employee and is given a unique order number. Each order contains specified quantities of one or more parts. Each order has a date of receipt as well as an expected ship date. The actual ship date is also recorded. Design an ER diagram for the mail-order database. Convert the ER model into a scheme for a relational database. List all relation schemes. For each relation scheme, identify the primary key and the foreign key. CO1

UNIT – II

4. (a) State what the following queries compute:
   (i) $\pi_{sname}(\pi_{sid}(\pi_{pid} \bowtie (\sigma_{color=blue}(Parts))) (\sigma_{cost<50}(Catalog) \bowtie Suppliers)$
   (ii) $(\pi_{sname}(\sigma_{color=yellow}(Parts)) \bowtie (\sigma_{cost<40}(Catalog) \bowtie Suppliers)) \cap (\pi_{sname}((\sigma_{color=red}(Parts)) \bowtie (\sigma_{cost<40}(Catalog) \bowtie Suppliers))$ (6M) CO2

   (b) Let the following relation schemas be given: $R = (A, B, C)$ and $S = (D, E, F)$. Give an expression in the tuple relational calculus that is equivalent to SQL for each of the following:
   (i) $\Pi_{A,F}(\sigma_{C=D}(R \times S))$ *(ii) R-S* (6M) CO2

(OR)

5. Consider a relation R(A, B) that contains r tuples and a relation S(B, C) that contains s tuples; assume $r > 0$ and $s > 0$. Make no assumptions about the keys. For each of the following relational algebra expressions, the state in terms of r and s the minimum and the maximum number of tuples that could be in the result of the expression.
   (i) $R \cup \rho_{s(A,B)}\ S$ (ii) $\pi_{A,C},(R \bowtie S)$ (iii) $\pi_B R - (\pi_B\ R - \pi_B S)$
   (iv) $\sigma_{A>B} \cup \sigma_{A<B} R$ CO2

UNIT – III

6. (a) For a given relation *R (A, B, C, D, E, F)* MVDs $A \rightarrow\rightarrow B$ and $AB \rightarrow\rightarrow C$, and FD $AB \rightarrow E$ hold. Is it in 4NF? If not, normalize it into 4NF. (6M) CO3
   (b) Write an algorithm for the block nested loop join. (6M) CO3

(OR)

7. Assume the following set of functional dependencies hold for the relation *R(A, B, C, D, E)*: $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$.
   (i) Is E a key for R? Explain. (ii) List all the candidate keys and super keys (iii) Prove that BC is a Key for R. CO3

UNIT – IV

8. (a) Give an example schedule that follows the non-recoverability. How do you convert the non-recoverable schedule into a recoverable? (6M) CO4
   (b) Discuss the Lock based concurrency protocol with an example. (6M) CO4

(OR)

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B.TECH. DEGREE EXAMINATION, OCTOBER-2022

Semester IV [Second Year] (Supplementary)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours | Maximum Marks: 60

Answer Question No.1 compulsorily. (12 x 1 = 12)
Answer One Question from each unit. (4 x 12 = 48)

1. Answer the following in brief:
   (a) Define DBMS. CO1
   (b) List any four applications of DBMS. CO1
   (c) What is an entity-relationship model? CO1
   (d) Define DDL and DML. CO2
   (e) What is a view? Explain it. CO2
   (f) What is the difference between tuple relational calculus and domain relational calculus? CO2
   (g) What are the Aggregate operations used in Relational Algebra? CO3
   (h) Define Functional dependency. CO3
   (i) Explain the desirable properties of decomposition. CO3
   (j) Give the reasons for allowing concurrency. CO4
   (k) Define shadow paging. CO4
   (l) Differentiate strict two-phase locking protocol and rigorous two-phase locking. CO4

UNIT – I

2. (a) Explain the database system structure with a neat diagram. (6M) CO1
   (b) Construct an ER diagram for an employee payroll system. (6M) CO1

(OR)

3. (a) Discuss different types of attributes in the ER model. (6M) CO1
   (b) Define the following (i)Data model (ii) Instance (iii) Schema. (6M) CO1

UNIT – II

4. (a) Discuss in detail Tuple Relational Calculus with syntax and examples. (6M) CO2
   (b) List and explain the different data types used in SQL. (6M) CO2

(OR)

5. (a) Explain the use of the Division operator in relational algebra. (6M) CO2
   (b) Consider the following relations: (6M) CO2
   Employee (emp_no, emp_name, designation, DOJ, salary, dept_no)
   Department (dept_id,dept_name)
   Write SQL Queries for the following
   (i) List out the employees whose annual salary is more than 800000.
   (ii) List all the employees who earn more than the lowest in dept_id 20.
   (iii) Display all those departments in which the no. of employees are more than 4.

UNIT – III

6. (a) Explain 1NF, 2NF, and 3NF with an example. (6M) CO3
   (b) Explain the selection and projection set operations with examples. (6M) CO3

(OR)

7. (a) Explain Multivalued dependency with 4^{th} normal form. (6M) CO3
   (b) Explain about inference rules with details. (6M) CO3

UNIT – IV

8. (a) Explain read-only, write-only, and read-before-write protocols in serializability. (6M) CO4
   (b) Discuss various database recovery methods. (6M) CO4

(OR)

9. (a) Write about the need for concurrency control. Explain concurrency control without locking. (8M) CO4
   (b) Write short notes on SQL injection. (4M) CO4

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B.TECH. DEGREE EXAMINATION, MAY-2022

Semester IV [Second Year] (Supplementary)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours | Maximum Marks: 60

Answer Question No.1 compulsorily. (12 x 1 = 12)
Answer One Question from each unit. (4 x 12 = 48)

1. Answer the following:
   (a) Define single-valued and multi-valued attributes. CO1
   (b) Define an instance and Schema. CO1
   (c) What is a data model? List the types of the data model used? CO1
   (d) Briefly explain about Tuple Relational Calculus. CO2
   (e) What are the three classes of SQL expression? CO2
   (f) Write short notes on a relational model. CO2
   (g) What is a primary key? CO3
   (h) Define normalization. CO3
   (i) Write brief notes on Dangling tuples. CO3
   (j) What are the timestamps associated with each data item? CO4
   (k) What are the two types of serializability? CO4
   (l) Define Statistical Database Security. CO4

UNIT – I

2. (a) Explain the Boyce/Codd normal form with an example. Also, state how it differs from that of 3 NF. (6M) CO1
   (b) Describe the three schema architecture with a block diagram. Why do we need mappings between schema levels? (6M) CO1

(OR)

3. (a) Construct ER model for COMPANY database application. (6M) CO1
   (b) Explain the advantages of DBMS. (6M) CO1

UNIT – II

4. (a) Write the SQL expressions for the following relational database.
   Sailors (Sailor id, Boat id, Sailorname, rating, age)
   Reserves (Sailor id, Boat id, Day)
   Boat (Boat id, Boatname, color)
   (i) Find the age of the youngest Sailor for each rating level
   (ii) Find the age of the youngest Sailor with age>18, for each rating with at least 2 sailors(of any age)
   (iii) Find the no. of reservations for each red boat (6M) CO2
   (b) Explain INSERT, DELETE and UPDATE statements with an example (6M) CO2

(OR)

5. (a) Write a short note on the following: (6M) CO2
   (i) Data manipulation language
   (ii) Data definition language
   (iii) Data control language
   (b) Explain Domain Relational Calculus (DRC) with example. (6M) CO2

UNIT – III

6. (a) What is Schema refinement? Explain the problems caused by redundancy. (6M) CO3
   (b) Explain THIRD Normal Form and BCNF. What is the difference between them? (6M) CO3

(OR)

7. (a) What is Functional Dependency? And explain the types and properties of FD's. (6M) CO3
   (b) Define Join and write about types of joins. (6M) CO3

UNIT – IV

8. Explain the following protocols for concurrency control:
   (i) Lock-based protocols.
   (ii) Time stamp-based protocols. CO4

(OR)

9. (a) Explain various properties of Transaction. (6M) CO4
   (b) What is Serializabiltiy? Explain Conflict Serializability with an example. (6M) CO4

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Hall Ticket Number:

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B.TECH. DEGREE EXAMINATION, DECEMBER-2021

Semester IV [Second Year] (Supplementary)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours | Maximum Marks: 60

Answer Question No.1 compulsorily. (12 x 1 = 12)
Answer One Question from each unit. (4 x 12 = 48)

1. Answer the following:
   (a) Define DBMS. CO1
   (b) What is the difference between a database schema and a database state? CO1
   (c) What is E-R model? CO1
   (d) Differentiate between primary key and unique key. CO2
   (e) What is SQL? CO2
   (f) What is outer union operation? CO2
   (g) What is normalization? CO3
   (h) What is fully functional dependency? CO3
   (i) What is lossless join? CO3
   (j) Define transaction. CO4
   (k) What is system log? CO4
   (l) State lost update problem. CO4

UNIT – I

2. (a) Describe Centralized and Client server architectures for database system. (6M) CO1
   (b) Mention the advantages of using database approach. (6M) CO1

(OR)

3. Explain the following:
   (i) Entity type (ii) Relationship type (iii) Structural Constraints.
   Write in detail about various types of relational data model constraints. CO1

UNIT – II

4. Explain the basic operations of Relational Algebra with examples. CO2

(OR)

5. (a) Differentiate between independent and correlated nested queries. Describe your answer with suitable examples. (6M) CO2
   (b) What is a view? Write short notes on views. (6M) CO2

UNIT – III

6. (a) With suitable examples explain 1NF, 2NF, 3NF and BCNF. (6M) CO3
   (b) Explain the inference rules of functional dependencies. (6M) CO3

(OR)

7. (a) What is meant by decomposition? Explain desirable properties of decomposition with suitable examples. (6M) CO3
   (b) Give the relational synthesis algorithms that satisfy following relational decomposition properties.
   (i) Lossless join property (ii) Dependency preservation property. (6M) CO3

UNIT – IV

8. (a) What is serializability? Explain conflict and view serializability with examples. (6M) CO4
   (b) Define the term Lock. Explain how Binary and Shared/Exclusive locks can be used to control concurrency. (6M) CO4

(OR)

9. (a) What is the role of mandatory access control in database security? Explain. (6M) CO4
   (b) Discuss various types of database failures. (6M) CO4

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B.TECH. DEGREE EXAMINATION, AUGUST-2021

Semester IV [Second Year] (Regular & Supplementary)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours | Maximum Marks: 60

Answer Question No.1 compulsorily. (12 x 1 = 12)
Answer One Question from each unit. (4 x 12 = 48)

1. Answer the following:
   (a) What is data independence? CO1
   (b) Give an example for weak entity type. CO1
   (c) Define foreign key. CO1
   (d) Differentiate between DDL and DML. CO2
   (e) What is a virtual table? CO2
   (f) Write any two unary operations in relational algebra. CO2
   (g) Define functional dependency. CO3
   (h) What is minimal cover? CO3
   (i) What is a multi-valued dependency? CO3
   (j) What is database recovery? CO4
   (k) Define serializability. CO4
   (l) What is apparent key? CO4

UNIT – I

2. (a) What are the different types of database end users? Discuss the main activities of each. (6M) CO1
   (b) With a neat sketch explain the three-schema architecture of a database system. (6M) CO1

(OR)

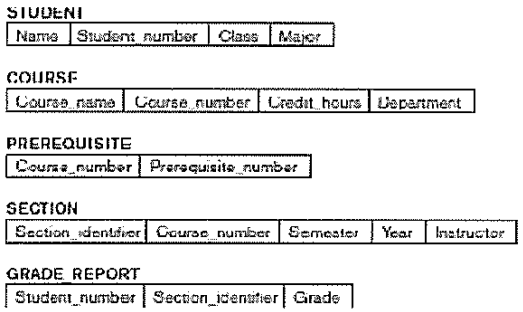
3. What is a conceptual data model? Explain its role in database design. CO1

UNIT – II

4. (a) With suitable examples, Illustrate various types of joins in relation algebra. (6M) CO2
   (b) What is meant by complete set of relational algebra operations? Explain it. (6M) CO2

(OR)

5. (a) Consider the following database schema. What are the integrity constraints that should hold on the schema? Write appropriate SQL DDL statements to define the database. (6M) CO2



   (b) Discuss how grouping and aggregate functions are used in SQL. Also discuss various options of each. (6M) CO2

UNIT – III

6. (a) Briefly explain the following:
   (i) Closure of dependencies (ii) Minimal cover
   (iii) Inference rules. (6M) CO3
   (b) Define Normalization. Explain its need. (6M) CO3

(OR)

7. (a) Explain 4NF and 5NF with examples. *(6M) CO3*
   (b) Describe the algorithms for SELECT and JOIN operations in query processing and optimization. (6M) CO3

UNIT – IV

8. (a) What is a Transaction? Explain the desirable properties of transactions. (6M) CO4
   (b) What is concurrency control method? Discuss various problems that could arise whenever it is not controlled. (6M) CO4

(OR)

9. (a) What is the purpose of database recovery? Explain log based database recovery techniques. (6M) CO4
   (b) What are the different types of SQL injection attacks? Explain each briefly. (6M) CO4

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Hall Ticket Number: 4b

CS/IT222(R20)

B.TECH. DEGREE EXAMINATION, OCTOBER-2022

Semester IV [Second Year] (Regular)

DATABASE MANAGEMENT SYSTEMS

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following in brief:
   (a) List the data models. CO1
   (b) Define ER diagram. CO1
   (c) What are overlap constraints? CO1
   (d) What are aggregate functions? CO1
   (e) How NULL values are handled in SQL? CO2
   (f) List the difference between primary key and candidate key. CO2
   (g) What is the need of DISTINCT keyword in SQL? CO3
   (h) What is empty entity? CO3
   (i) Define Fifth Normal Form (5NF). CO4
   (j) What is an integrity constraint? CO4
   (k) Define Lock. CO5
   (l) Define log-based recovery. CO5
   (m) What is Database consistency? CO5
   (n) What are ACID rules? CO5

UNIT – I

2. (a) Explain the following terms:
   (i) Database (ii) Meta data (iii) Data Dictionary (6M) CO1
   (b) List the different keys in RDBS and explain each. (8M) CO1

(OR)

3. (a) Construct the schema diagram for library management system. (7M) CO1
   (b) Discuss database architecture with neat diagram. (7M) CO1

UNIT – II

4. Write SQL statements for following: CO2
   Student(Enrno, name, courseId, emailId, cellno)
   Course(courseId, course_nm, duration)
   (i) Add a column department in course table.
   (ii) List the total number of registered courses of each student.
   (iii) Updated check constraint for emailId, it must be unique.
   (iv) Find out list of students who have enrolled in "computer" course.
   (v) List name of all courses with their duration.
   (vi) List name of all students start with "a".
   (vii) List emailId and cell no of all mechanical engineering students.

(OR)

5. (a) Explain the following SQL constructs with examples: (8M) CO2
      (i) order by
      (ii) group by and having
      (iii) as select
      (iv) schema
   (b) Explain relational algebra with example. (6M) CO2

UNIT – III

6. (a) What is functional dependency? Explain its usage in database design. (7M) CO3
   (b) How to represent a weak entity set in ER diagram? Explain with suitable example. (7M) CO3

(OR)

7. (a) Does 3NF allow redundancy? Justify your answer. (7M) CO3
   (b) Explain about BCNF and list the difference between BCNF and 3NF. (7M) CO3

UNIT – IV

8. (a) Discuss read-only, write-only and read-before-write protocols in serializability. (7M) CO4
   (b) Explain the use of 2PL would prevent interference between two transactions. (7M) CO4

(OR)

9. (a) Explain timestamp-based protocols with suitable example. (7M) CO4
   (b) Discuss the purpose of the checkpoint mechanism, How often should checkpoints be performed? (7M) CO4

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