

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH] JUNE-JULY 2023

Paper Code: IT408

Subject: Advanced Database

Management Systems

Maximum Marks: 75

Time: 3 Hours

Note: Attempt any five questions in all including Q.No. 1 which is compulsory.

- Q1** i) Define various integrity constraints in relational model. What do you mean by canonical cover of a set of functional dependencies F over a relation schema R? (5)
- ii) What are conflict operations in concurrency control? Explain nested and long duration transactions with suitable examples. (5)
- iii) What is the difference between object relational model and object-oriented model? In the context of query optimization, find the I/O overhead (in terms of disk block transfers) for PROJECT operation $\pi_{A, B, C}(R)$ where B is a candidate key of R. (5)
- iv) Write difference between persistent and transient objects. Explain the term object versioning. (5)
- v) Explain the phantom deadlock concept in distributed database with suitable example? (5)
- Q2** i) Explain the concept of specialization used in extended ER model. What are various types of possible specializations? Can an entity set have multiple specializations? (6.5)
- ii) Explain Semi-join, Equi-Join and Outer -join operations in relational algebra with suitable example. (6)
- Q3** i) How size estimation of NATURAL JOIN operation (between relations R & S) is performed? (6.5)
- ii) Transform the following SQL query into equivalent relational algebra expressions, draw the initial query tree for each such expression and then derive optimal query trees using heuristic method -
SELECT P.pid, P.Pname, P.Address, P.Phone
FROM BOOK B, PUBLISHER P
WHERE P.pid = B.pid and B.Category = "Textbook"
- Q4** i) Explain various types of data fragmentation methods used in distributed database with suitable example. (6)
- ii) What do you mean by distributed query processing? How is semi-join operation helpful in it? (6.5)
- Q5** i) What is the role of object identity in Object Oriented data model? How persistence is handled in an OO database system? (6)
- ii) What is distributed deadlock handling? Suggest one method of it. (6.5)

P.T.O.

[-2 -]

- Q6 i) Explain following terminology in transaction management - (6)
a) Compensating Transactions b) Weak level of Consistency
ii) Explain two phase commit protocol in distributed database recovery. (6.5)

- Q7 i) Write conditions of 2NF and 3NF. Suggest a set of functional dependencies so that relation schema R (A, B, C, D) with candidate key as {AB} satisfies 2NF but not 3NF conditions. (6)
ii) Differentiate between star schema and snowflake schema representation of data warehouse. (6.5)

- Q8 What is k-means clustering algorithm? Using this algorithm, generate two clusters for the following data. (12.5)

AGE	INCOME (in thousands)
20	10
30	20
40	30
50	50
60	55

- Q9 ✓ Write **short notes** on the following - (4 + 4 + 4.5 = 12.5)
i) Multivalued Dependency
ii) Secondary and Clustering file index
iii) Distributed Database Transparencies

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH] APRIL – MAY 2019

Paper Code: IT-408

Subject: Advanced Data Base Management System

Time : 3 Hours

Maximum Marks : 75

Note: Attempt any five questions including question no. 1 which is compulsory.

- Q1** Attempt following:- **(any five)** **(5x5=25)**
- Write the condition of forth normal form. Define a schema which is in BCNF but not in 4F.
 - A set of FDs for the relation R {A, B, C, D, E, F,} is $AB \rightarrow C$, $C \rightarrow A$, $BC \rightarrow D$, $ACD \rightarrow B$, $BE \rightarrow C$, $EC \rightarrow FA$, $CF \rightarrow BD$, $D \rightarrow E$. Find a minimum cover for this set of FDs.
 - How does object relational model support user defined data type concept?
 - Write any four transparencies supported in a distributed database system.
 - What is a nested transaction? How does it differ from conventional transaction?
 - Explain the nested loop join method of implementation for natural join operation.
 - What do you mean by object identifier? Explain the role of persistent objects.
- Q2** **(6)**
- Draw a neat diagram of the architecture of object oriented data base and explain.
 - Differentiate between RDBMS, ORDBMS and OODBMS **(6.5)**
- Q3** **(6)**
- What is the requirements of Data partitioning? Discuss the problems and challenges associated with data partitioning. Enlist advantages of the partitioning in brief.
 - Differentiate between Round-robin partitioning, Range index partitioning, Hash partitioning using suitable block diagram. **(6.5)**
- Q4** **(6)**
- What do you mean by a query tree and how is it helpful in query optimization?
 - Consider three relations R (A, B, C), S(C, D, E) and T (E, F) where attributes A, C and E form the primary keys of relations R, S and T respectively. If R has 500 tuples, S has 1000 tuples and T has 900 tuples then compute the size of (R natural join S natural join T) and give an efficient way for computing the join. **(6.5)**
- Q5** For the following Relational query, perform translation to query tree. Show the optimization by the reordering of the join operations and choosing an evaluation algorithm for each join operation. **(12.5)**

```

SELECT P.name
FROM P, R, S
WHERE S.thema LIKE 'Computing'
AND S.class = R.class
AND R.id = P.id

```

- Q6** How does generalization concept extends data base design part? Explain types of generalizations. **(12.5)**
- Q7** **(6)**
- Explain two phase commit protocol in distributed database. Also explain how does database recovery is performed in this protocol.
 - Explain graph based method of distributed deadlock handling. What do you mean by false deadlock? Explain with suitable example. **(6.5)**
- Q8** **(6)**
- Explain multidimensional data model in data warehousing? What are its applications?
 - Explain various association and classification rules used in data mining. **(6.5)**

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH] APRIL-MAY 2018

Paper Code: IT 408

Subject: Advanced Data Base Management Systems

Maximum Marks :60

Time : 3 Hours

Note: Attempt five questions in all including Q. NO. 1 which is compulsory.

- Q1. Explain following in brief (any five): (5x4=20)
- Write different integrity constraints in a relational database management system.
 - Explain block nested loop join implementation for natural join operation of relational algebra and compute the cost of its implementation.
 - What is horizontal and vertical fragmentation in distributed database?
 - Explain the phantom effect in distributed deadlock management.
 - Write any two differences between object relational model and object model in a database system.
 - Explain various mining techniques such as Prediction, Classification clustering, Co-relation, Association in brief.
- Q2. Write an algorithm to compute closure of an attribute. What do you mean by loss less joint decomposition of a relation? Suppose a relation scheme R (A B C D) is decomposed in to R1 (A,B,C) and R2 (A, D) with valid functional dependencies A→BC and A→D in R1 and R2 respectively. How will you define attribute A in relation R? (10)
- Q3. a) How does 3NF differ from BCNF? Further, through an example prove that BCNF is stronger than 3NF. (5x2=10)
 b) Explain multivalued dependency and its role in forth normal form. Give an schema which satisfies all normal form based on functional dependency but still has anomalies.
- Q4. Consider three relations R(A,B,C), S (C,D,E) and T(E,F). If R has 500 tuples, S has 100 tuples and T has 900 tuples then compute the size of $R \bowtie S \bowtie T$. Further, give an efficient way to compute the join. (10)
- Q5. Explain various concurrency control protocols in distributed database. (10)
- Q6. Write two phase commit protocol for data distributed database recovery. (10)
- Q7. What do you mean by ACID properties of a transaction? Explain Nested and Multilevel transactions? How are compensating transactions useful in maintaining the database consistency? (10)
- Q8. What are association rules in the context of data mining? Describe the terms support and confidence with the help of suitable examples. (10)
- Q9. Write short notes on the following: (5x2=10)
- k-means algorithm for clustering
 - Long duration transactions

(Please write your Exam Roll No.)

Exam Roll No.

SUPPLEMENTARY EXAMINATION

EIGHTH SEMESTER [B.TECH/M.TECH] OCTOBER – NOVEMBER 2016

Paper Code: IT-408

Subject: Advanced Database Management Systems

Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions including Q.no. 1 which is compulsory.

- Q1 Attempt **any four:** (4x5=20)
(a) Explain Multi valued and Join Dependency with example.
(b) Explain the Limitations of Relational Data Model.
(c) Discuss the advantages of Query optimization.
(d) How is Data Warehousing different from Data Base?
(e) Explain various normal forms with example.
- Q2 What are the advantages of a distributed database management system over a Centralized DBMS? Explain in detail. (10)
- Q3 Draw and ER diagram for Library Management system and explain the various notation used. (10)
- Q4 (a) Differentiate between parallel and distributed DBMS. Quote an example for each of them. (5)
(b) What is distributed Deadlock and how is it handled? (5)
- Q5 Explain the techniques used for protecting the database against unauthorized access to a database. (10)
- Q6 Define with example: (10)
(a) Long Duration Transactions
(b) Weak Levels of Consistency
- Q7 Explain the use of Data warehouse and Data mining. Discuss and explain Data Warehouse Architecture in detail. (10)
- Q8 Write short note on **any two:** (5x2=10)
(a) Complex Data Semantic
(b) Fragmentation and Replication
(c) Association and Classification rule in Data Mining
(d) Knowledge representation using rules

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH./M.TECH.] MAY-JUNE 2016

Paper Code: IT-408

Subject: Advanced Database Management Systems

Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions.

- Q1 (a) Discuss the entity integrity and referential integrity constraints. Why is each considered important? (6)
(b) Explain the theory of functional dependency. Why functional dependency is important in relational database design? (6)
- Q2 (a) Discuss the options for mapping EER model constructs to relations. (6)
(b) Explain the various relational algebra operations with suitable examples. (6)
- Q3 (a) What is meant by the term heuristic optimization? Discuss the main heuristics that are applied during query optimization with an example. (6)
(b) How does a query tree represent a relational algebra expression? What is meant by execution of a query tree? Discuss the rules for transformation of query tree. (6)
- Q4 (a) List the basic operations of following: Collection, Iterator, Set, Bag. (6)
(b) How type constructors are created and used in SQL? Explain with an example. (6)
- Q5 (a) How are horizontal and vertical partitioning of a relation specified? Explain. (6)
(b) Discuss the different techniques for executing an equi sjoin of two tables located in different sites. What main factors affect the cost of data transfer? (6)
- Q6 (a) What is the purpose of compensating transactions? Explain with an example. (6)
(b) Explain the working of a TP monitor. What are various TP monitor architectures? (6)
- Q7 (a) What are classification rules and how are decision trees associated with them. (6)
(b) What is entropy and how it is used in building decision trees? (6)
- Q8 (a) What is the multidimensional data model? Explain roll up and drill down displays. (6)
(b) Explain: Star schema, snowflake schema and fact constellation. (6)

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH/M.TECH] MAY-JUNE 2015

Paper Code: IT-408 Subject: Advanced DataBase Management Systems

Time: 3 Hours Maximum Marks: 60

Note: Attempt any five questions including Q no. 1 which is compulsory.

Q1 Answer the following short answer questions:- (2x10=20)

- (a) List out the ACID properties.
- (b) What do you understand by generalization and specialization in data modeling?
- (c) Differentiate between dense ad sparse index files.
- (d) What do you understand by data mining?
- (e) What are checkpoints?
- (f) Differentiate between object-oriented and object-relational databases.
- (g) Differentiate between shard disk and shared memory parallel database architectures.
- (h) List the different tyes of failures in database systems.
- (i) What is the need of normalization?
- (j) What is fact constellation?

Q2 What do you understand by Triggers. Differentiate between Row-Level and Statement-level triggers. Consider the schema for an organization having EMPLOYEE table with attributes (EID, EName, Rank, Salary, DOB, Bonus). Create triggers to (a) Keep the bonus attribute in Employee table always 3% of the salary attribute, and (b) Store the count of employees having salary> 1,00,000 in a table R. (10)

Q3 Differentiate between the following:- (10)

- (a) Lossy and Lossless decomposition
- (b) Aggregation and ternary relationship
- (c) Triggers and Assertions
- (d) Horizontal and Vertical Fragmentation

Q4 (a) What is a minimal set of functional dependencies? Does every set of dependencies have a minimal equivalent set? Is it always unique? (5)
(b) Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF? (5)

Q5 (a) Explain the issues that are to be addressed for a distributed database design. (5)
(b) Discuss the two-phase locking protocol and timestamp-based protocol. (5)

Q6 (a) What do you understand by a data warehouse? Discuss the multi-tier architecture of a data warehouse. (5)
(b) Discuss the various types of updates possible in a data warehouse with the help of an example. (5)

Q7 (a) Discuss the typical phases of query processing with the help of a diagram. What is the need of query optimization? (5)
(b) What is query tree? What is meant by an execution of a query tree? Explain with an example. (5)

Q8 Write shot notes on the following:- (10)

- (a) Integrity constraints
- (b) Indexing
- (c) Extended ER diagram
- (d) Deadlock in distributed systems.

Please write your Exam Roll No.)

Exam Roll No.

END TERM EXAMINATION

EIGHT SEMESTER [B.TECH/M.TECH] MAY-JUNE 2014

Paper Code: IT-408

Subject: Advanced DBMS

Time: 3 Hours

Maximum Marks: 60

Note: Attempt any five questions including Q.no. 1 is compulsory. Select one question from each unit.

- Q1 Short Answer Type:- (5x4=20)
- (a) Define integrity constraint and list all integrity constraints?
 - (b) Discuss relational model with the help of example.
 - (c) What is concurrency control? Explain it.
 - (d) Define data warehouse and data model?
 - (e) Define fragmentation and replication in distributed data storage?

Unit-I

- Q2 Describe various operations in relational algebra with the help of example? (10)

- Q3 Define normalization and explain various normal forms with the help of example? (10)

Unit-II

- Q4 Explain indexing and query optimization? (10)

- Q5 Explain semantic data model with the help of example. (10)

Unit-III

- Q6 What is distributed deadlock? Explain it. Also discuss the design of parallel database. (10)

- Q7 Explain the following in brief:-

- (a) Nested and multilevel transaction. (5)
- (b) Transactions Processing Monitors. (5)

Unit-IV

- Q8 Explain the various algorithms for rule discovery. (10)

- Q9 Explain in detail the data warehousing architecture? (10)

END TERM EXAMINATION

EIGHTH SEMESTER [M.TECH/B.TECH] MAY-JUNE 2013

Paper Code: IT-408

Subject: Advanced database management systems

Time : 3 Hours

Maximum Marks:60

Note: Attempt any five questions. Question no. 1 is compulsory.

(3X4=12)

Q.1 Explain in brief:

- (a) List the unique features of Extended ER diagram
- (b) Define Indexing and Query optimization.
- (c) Define Nested and Multilevel Transactions.
- (d) Explain the differences between 3 NF & BCNF.

Q.2 (a) How is inheritance implemented in SOL? (6)

- (b) What is preprocessing? What is the need of this step while building Data Warehouse? (6)

Q.3 (a) How does the concept of an object in the object-oriented model differ from the concept of an entity in the E-R model. (6)

- (b) Suppose a new class 'C' is created as a subclass of a class 'C'. What changes may have to be made to the database objects. (6)

Q.4 (a) Discuss the relative advantages of centralized and distributed database. (6)

- (b) Explain the differences between (2)

- (i) Fragmentation transparency
- (ii) Replication transparency
- (iii) Location transparency

Q.5 (a) Why is it not desirable to force users to make an explicit choice of a query-processing strategy 1. Explain in detail. (6)

(b) Consider

Select T. branch - name from branch T, branch s where T. Assests > S.assests and S.branch - city = "Delhi" (6)

Write an efficient algebra expression that is equivalent to this query. Justify your choice.

Q.6 (a) Explain why a non-recoverable schedule results in a loss of transaction atomicity? (6)

- (b) What is the purpose of Distributed Transaction Modeling and concurrency control. (6)

Q.7 (a) Discuss and Explain the rules for knowledge representation. (6)

- (b) Explain any algorithm for rule discovery. (6)

Q.8 Write short notes on **any two**:

- (a) Transaction processing monitors
- (b) Distributed deadlock
- (c) Architecture of object oriented database.

(6X2=12)

(Please write your Exam Roll No.)

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH/M.TECH] MAY-2010

Subject: Advanced DBMS

Paper Code: IT 408
Paper ID: 15408
Time : 3 Hours

Maximum Marks :60

Note: Attempt one question from each unit and Q. No. 1 is compulsory.

1. Short Answer Type:

[5 x 4 = 20]

- Explain what is meant by repetition of information and inability to represent information.
- How does the concept of an object in the object oriented model differ from the concept of an entity in the entity relationship model?
- Explain the concept of generalization and specialization.
- How data is represented in object oriented databases? Explain.
- Explain various notions of transparency in distributed databases.

UNIT I

- Draw an Extended ER diagram for a garment manufacturing company. The entities include warehouses, production units, marketing wing, vendor and product types. Define the relationships between each of these entities. Take the attributes so that they can define a particular entity properly. [10]

- a) What are entities? Define various types of mapping between entities. [4]
b) Write down relational algebra and TRC statements for the following queries:
Given relations are: S (supplier_no, supplier_name, city), P (part_no, part_name, color), SP (supplier_no, part_no, quantity_supplied)
 - List the names of all those suppliers who supplied the part 'Hammer'.
 - List the names of all those parts which are supplied by supplier name 'A' and 'B'. [6]

UNIT II

- What do you mean by query optimization? Explain various heuristics used in query optimization. [10]
- Explain how complex data is represented in object oriented databases. How object relational databases differ from object oriented databases. [10]

UNIT III

- Explain two and three phase commit protocols in distributed databases. [10]
- Explain the various techniques for deadlock handling in distributed databases.

UNIT IV

- Explain the multidimensional data model in used in data warehouses. [10]
- What is data mining? Explain the decision tree classifiers. [10]