Exam.Code:915
Sub. Code: 6802

1115

B.E./B.E. MBA (Computer Science and Engineering)
Third Semester
CS-302: Database Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1(Section-A) which is compulsory and selecting atleast two questions each from Section B - C

x-x-x

SECTION A

Q1)
a) When the functional dependency is said to be trivial?
b) What is Domain key normal form?
c) What is RBAC?
d) What is cascade less schedule?
e) Give difference in authentication and authorization.
f) What is intension and extension of database?
g) Can a secondary index be sparse?
h) What is dirty read?
i) Differentiate static and dynamic hashing.
j) Name few techniques used for encryption of data.

(1x10= 10 marks)

SECTION B

Q2)a) A university registrar's office maintains data about the following entities : (1) Courses, including number, title, credits, syllabus, and prerequisites; (2) Course offerings, including course number, year, semester, section number, instructor, timings, and classroom; (3) Students, including student-id, name, and program; and (4) Instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints. **(5 marks)**
(b) Compare strong and weak entity set. **(2 marks)**
c) What is aggregation and where it is used. Give an example. **(3 marks)**

Q3)a) Compare various query optimization techniques. **(3 marks)**
b) Compare various file organization techniques **(4 marks)**
c) Give differences in strict and rigorous 2PL. How and why we upgrade and downgrade locks? **(3 marks)**

Q4) a) Write expression in relational algebra or Calculus for following: **(8 marks)**
Customer(Customer_name , street, city)
Branch(branch_name,branch_city)
Account(branch_name, acc_no, balance)
Depositor(Customer_name, acc_no)
(i) Find out list of customer who have an account at all branches located in " Chandigarh".
(ii) Find out all customer who have account in 'Panchkula' city and balance is greater than 10,000.
(iii) Find out list of all branch name with their maximum balance.
(iv) Find the name of customers who live in same street and city as that of "Abraham".
b) What is Correlated query? Give example based on the database given in part a. **(2 marks)**

SECTION C

Q5) a) Consider the University management system. Assume the database and apply all normal forms on it. Discuss anomalies in each case. **(5 marks)**
b) Give various differences in view resolution and view materialization approaches for maintaining views? **(2 marks)**
c) Design a trigger named auditor to insert data into an existing table audi_ trail_for_bank of all insertions, deletions and updations carried on table Bank_Transactions. The audi_ trail_for_bank maintains type of operation and time of operation as fields. (3marks)

Q6 a) Since indices speed query processing, why might they not be kept on several search keys? List as many reasons as possible. **(3 marks)**
b) When is it preferable to use a dense index rather than a sparse index? Explain your answer. **(3 marks)**
c) All Conflict Serializable schedules are view Serializable but the vice versa is not true. Support it with examples. **(4 marks)**

Q7) (a) Consider schedule S with transaction T1 and T2. T1 transfer Rs. 150 from account A to C and T2 adds Rs. 50 into account A. Prepare concurrent schedule with two phase locking protocol. **(4 marks)**
(b) Explain various deadlock prevention methods. **(4 marks)**
c) What is view serializability and how it can be tested? **(2 marks)**

x-x-x

Exam.Code:0915
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1127

B.E. (Computer Science and Engineering)
Third Semester
CS-302: Database Systems

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

X-X-X

Q1.

(i) What do you understand by Shadow Paging? 2
(ii) Differentiate between super key and primary key using an example. 2
(iii) What are domain key normal forms? 2
(iv) Discuss Serializability and Concurrency Control. 2
(v) What are the various states of a transaction? 2

SECTION – A

Q2 (a) Compare various indexing techniques using examples. 5

Q2 (b) Discuss various advantages of DBMS over File Systems. 5

Q3 (a) Design a database using ER Model for student record keeping system of your institute. 5

Q3 (b) Demonstrate ER to Relational Model Conversion using suitable example. 5

Q4 (a) Discuss various query optimization strategies. 5

Q4 (b) Compare cursors and triggers using suitable examples. 5

SECTION – B

Q5 Why are various normal forms required? Compare them using a real life scenario and discuss various types of dependencies involved in them. 10

Q6 (a) Discuss various concurrency problems and concurrency control mechanisms. 5

Q6 (b) Compare different Recovery techniques using suitable examples. 5

Q7 Compare various security mechanisms for database protection using a case study. 10

X-X-X

Exam.Code:0915
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1128
B.E. (Computer Science and Engineering)
Third Semester
CS-302: Database Systems

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Answer the following in brief:-

a) What is Query Tree?

b) Explain atomicity of transaction.

c) Define threat with example.

d) What are clustered indexes? List its advantages and disadvantages.

e) What is join dependency? How it is related to normalization?

f) Define deferred update. Give example.

g) Difference between cursors and triggers.

h) Define cardinality in ER diagram. Give example.

i) List all the aggregate operators in SQL.

j) Define digital signatures. (10x1)

UNIT – I

II. Consider the following schemas:

Sailors (sid, sname, rating, age)

Reserves (sid, bid, day)

Boats (bid, bname, color)

Write the following queries in relational algebra, tuple relational Calculus and domain relational calculus:

a) Find the name of sailors who have reserved boat 103.
b) Find the names and ages of sailors with a rating above 7.
c) Find the names of sailors who have reserved a red boat.
d) Find the sname, bid, and day for each reservation.
e) Find the name of sailors who have reserved at least one boat. (10)

P.T.O.

III. a) How checkpoints are used in database recovery?

b) Define a transaction and its desirable ACID properties. Explain the problem of dirty read by giving an example. (5x2)

IV. Consider the following relation for published books:
BOOK(Book_title, Author_name, Book_type, List_price, Author_affil, Publisher)
Author_affil refers to the affiliation of author.
Suppose the following dependencies exist:
Book_title → Publisher, Book_type Book_type → List_price
Author _name → Author _affit

a) What normal form is the relation in? Explain your answer.

b) Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition (10)

UNIT – II

V. Differentiate between the following:-

a) Strong entity set and a weak entity set

b) 1 :N and M:N cardinality

c) TRC and DRC

d) 3NF and BCNF

e) DAC and MAC (5x2)

VI. a) Explain two phase locking protocol. What are its disadvantages?

b) Explain types of access control method. Discuss the popular model for mandatory access control. Define Polyinstatiation. (2x5)

VII. a) What are the properties of transaction management? Explain serializability with example.

b) What is a query evaluation plan? What are its advantages and disadvantages? (2x5)

x-x-x

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SECTION – A

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Q3 (b) Demonstrate ER to Relational Model Conversion using suitable example. 5

Q4 (a) Discuss various query optimization strategies. 5

Q4 (b) Compare cursors and triggers using suitable examples. 5

SECTION – B

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Q6 (a) Discuss various concurrency problems and concurrency control mechanisms. 5

Q6 (b) Compare different Recovery techniques using suitable examples. 5

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x-x-x