

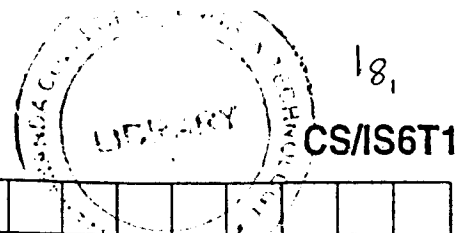
MODEL QUESTION PAPER  
V<sup>th</sup> SEMESTER B.E (COMPUTER SCIENCE & ENGINEERING)  
INFORMATION SCIENCE & ENGINEERING  
DATA BASE MANAGEMENT SYSTEMS

Time: 3 hrs

Max. Marks: 100

- 1 a Bring out the Advantages and disadvantages of DBMS Over conventional File Systems 0
- b Write the block diagram of DBMS and explain their components. Also highlight on different views of DBMS 10
- c Define the following terms. Give one example for each 4
  - Strong and Weak Entity
  - Composite and derived attributes.
- 2 a Give the ER Diagram for an Employee Database. Assume appropriate entities & attributes. Highlight all the properties of ER diagrams. 10
- b The following Entities are given: 10
  - EMP (E- Name, SSN, B date, Add, Sex, Salary, superannuation, D -no)
  - DEPT (D-Name, D-no, Mgrname, MgrStdDate)
  - DEPT\_LOC (DNUM, D-Location)
  - PROJECT (P- NUM, P-No, P-Loc, D-NUMBER)
  - WORK\_ON (ESSN, P-No, Hours)
  - DEPENDENT (ESSN, Dept-Name, Sex, B Date, Relationship)
    - Retrieve the Name and Address of all Employees who work for the 'Research' Dept.
    - List the Names of all Employees with two or more departments.
    - Find the names of Employees who work on all the projects Controlled by the dept No 5
- 3 a Give the ER-To- Relational Mapping Algorithm 10
- b Explain the Above Algorithm with an Example and show the intermediate steps. 10

- Create
  - View
  - Select
  - Update
  - Insert
- 5 a What is Normalization? Why it is needed? 4
- b Explain 1NF, 2NF & 3NF with an Example. 8
- c Explain 4 NF & Join dependencies. 8
- 6 a Highlight on Database Security Issue. Discuss Discretionary Access control in Detail 10
- b What is transaction? Explain its basic Properties 10
- 7 a Explain Schedules and Recoverability with examples 10
- b Discuss the concurrency control based on time sharp ordering. 10
- 8 a Write Short Note on 20
- Transaction Support in SQL
  - 2PL
  - Recovering from a System Crash
  - Dead Locks



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**Sixth Semester B.E. Degree Examination, July/August 2004**  
**Computer Science and Information Science Engineering**  
**Database Management Systems**

Time: 3 hrs.]

[Max.Marks : 100

**Note: Answer any FIVE full questions.**

1. (a) Explain the architecture schema of database management system. (8 Marks)  
 (b) Discuss the classification of DBMS. (5 Marks)  
 (c) Explain the different phases of database design. (7 Marks)
2. (a) Discuss with example different types of attributes. (10 Marks)  
 (b) What are the different notations used to represent the relation? (4 Marks)  
 (c) Describe the characteristics of a relation. (6 Marks)
3. (a) Consider the following three tables - SAILORS, RESERVES and BOATS having the following attributes :  
     SAILORS (Sal-id , sal-name, ratings, age)  
     RESERVES (Sal-id, boat-id, day)  
     BOATS (boat-id, boat-name, colour)  
     Using the above schema solve the queries in relation algebra.  
     i) Find the name of sailors who have reserved boat 103. (2 Marks)  
     ii) Find the name of sailors who have reserved at least one boat. (2 Marks)  
     iii) Find the name of sailors who have reserved a red and a green boat. (3 Marks)  
     iv) Find the name of sailors, with age over 20 years, who have not reserved a red boat. (3 Marks)  
 (b) List the various types of join operations and explain with example. (10 Marks)
4. Consider the following relations for a database that keeps track of business trips of sales persons in a sales office.  
     SALES PERSON (SSN, NAME, Start-date, DEPTNO)  
     TRIP (SSN, FROMCITY, TOCITY, DEP-DATE, RET-DATE, TRIP-ID)  
     EXPENCES (TRIP-ID, Accno, Amount)  
     Specify the following queries in relational SQL.  
     i) Give the details for trips that exceeds Rs 2000 in expenses.  
     ii) Print the SSN of salesman who took trip to "MOONAR".  
     iii) Print the trip expenses incurred by the salesman with  $SSN = '234'$  (10 Marks)  
 (b) What are the tasks performed by Data definition language ? Give the complete systems with example for each. (10 Marks)

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5. (a) Discuss update anomalies.  
 (b) A set of FDs for relation  $R\{A, B, C, D, E, F\}$  are

$$\begin{aligned} A, B &\rightarrow C \\ C &\rightarrow A \\ B, C &\rightarrow D \\ A, C, D &\rightarrow B \\ B, E &\rightarrow C \\ E, C &\rightarrow F, A \\ C, F &\rightarrow B, D \\ D &\rightarrow E \end{aligned}$$

Find an irreducible cover for this set of FDs.

(8 Marks)

- (c) Define first, second and third normal forms.

(7 Marks)

6. (a) What are the different possible reasons for a transaction to fail in the middle of execution ?

(8 Marks)

- (b) Describe the different levels of isolation in SQL2.

(7 Marks)

- (c) Describe view equivalence and view serializability.

(5 Marks)

7. (a) What are UNDO and REDO-type log entries ?

(5 Marks)

- (b) Describe the shadow paging recovery techniques.

(10 Marks)

- (c) Discuss how recovery from catastrophic failures is handled.

(5 Marks)

8. (a) List the areas that addresses the database security.

(5 Marks)

- (b) Describe the DBA responsibilities for database security.

(5 Marks)

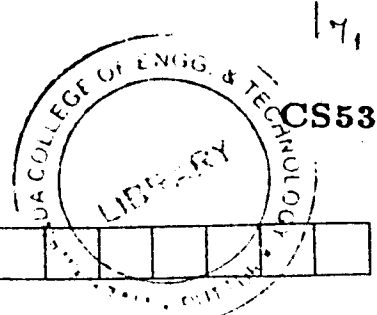
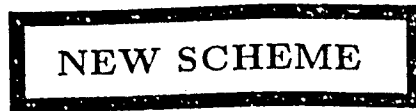
- (c) List the account level privileges provided to use database system.

(5 Marks)

- (d) Discuss mandatory access control for multi level security.

(5 Marks)

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Fifth Semester B.E. Degree Examination, January/February 2005

Computer Science Engineering  
**Data base management systems**

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

1. (a) Discuss the main characteristics of database approach and how it differs from traditional file system. (8 Marks)

(b) With a diagram explain typical software component modules of a DBMS. (8 Marks)

(c) Define Schema and instance. (4 Marks)

2. (a) Draw an E-R Diagram for hospital management system. Assume your own entities (Minimum of 5 entities), attributes and relations. Mention cardinality ratio. (10 Marks)

(b) Define the following terms with an example :

- i) Candidate key
- ii) Partial Primary key
- iii) Foreign Key
- iv) Super key

(10 Marks)

3. (a) Consider the following Schema for a company database  
Employee (Name, SSN, Address, Sex, Salary, Dno)  
Department (Dname, Dnumber, MGRSSN, MGRSTART DATE)  
Dept. Locations (Dnumber, Dlocations)  
Project (Pname, Pnumber, Plocation, Dnum)  
Works-On (ESSN, PNO, Hours)  
Dependent (ESSN, Dependent-name, Sex, Ddate, Relationship)  
Write the Queries in Relational Algebra to

- i) Retrieve the name and address of all employees who work for the Research department.
- ii) Find the names of the employees who work on all projects controlled by dept. number 5.
- iii) List all the projects on which employee Smith is working.
- iv) Retrieve the names of employees who have no dependents. (8 Marks)

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- (b) Discuss the following relational algebra operations. Illustrate with an example for each.

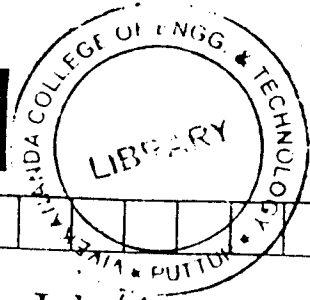
JOW, DIFFERENCE, SELECT, UNION

(12 Marks)

4. (a) What is the need for normalization? Explain the first, second and third normal forms with example. (12 Marks)
- (b) Consider the Scheme  $R = (A, B, C, D, E)$  which is decomposed into  $R_1 = (A, B, C)$  and  $R_2 = (C, D, E)$  with the following functional dependencies  
 $A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A$ .
- Show that the above decomposition of the Scheme  $R$  is not a loss-less join decomposition. (8 Marks)
5. (a) List and explain the commands available for retrieving and updating the database in SQL. (8 Marks)
- (b) Explain joins and views in SQL with examples. (8 Marks)
- (c) Explain the following clauses :
- i) From ii) Having iii) Order by iv) Group by (4 Marks)
6. (a) Explain properties of a transaction with state transition diagram. (10 Marks)
- (b) With an algorithm explain 2-phase locking. (10 Marks)
7. (a) Explain the database recovery techniques. (10 Marks)
- (b) Explain the terms
- i) Database authorization ii) Access control  
 iii) Data Encryption iv) Privileged account  
 v) Database audit
- (10 Marks)
8. Write short notes on :
- i) Database System Utilities ii) Two-Phase Commit Protocol  
 iii) Data Models iv) Indexes in SQL
- (20 Marks)

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**NEW SCHEME**



161 ✓  
CS53

USN

Fifth Semester B.E. Degree Examination, July/August 2005

Common to CS/IS

**Data base management systems**

Time: 3 hrs.]

[Max.Marks : 100

Note: Answer any FIVE full questions.

1. (a) Write the general architecture of typical DBMS. What are the effects of data independence in DBMS?mh8
- (b) What are the different levels of abstraction of a DBMS? Briefly explain each of them. (6 Marks)
- (c) Write an ER diagram for a typical bus reservation system. (6 Marks)
2. (a) What is cardinality ratio? What are the different types of cardinality ratio in a binary relationship? Give one example for each type. (6 Marks)
- (b) Define the following terms and give one example for each :
  - i) Primary key
  - ii) Weak entity
  - iii) Multivalued attribute. (6 Marks)
- (c) What do you mean by integrity w.r.t database? Explain entity integrity and referential integrity. (8 Marks)
3. (a) Define different set operations in relation algebra. Give one example for each. (8 Marks)
- (b) Consider the following schema and write the relational algebra expressions for the queries given below :

SAILORS (Sid, Sname, rating, age)  
BOATS (bid, bname, color)  
RESERVES (sid, bid, day).

  - i) Find names of sailors who reserved green boat
  - ii) Find the colors of boats reserved by "Ramesh"
  - iii) Find names of sailors who have reserved a red or a green boat.
  - iv) Find the "sids" of sailors with age over 20 who have not registered a red boat. (8 Marks)
- (c) List aggregate functions commonly used in relational algebra. Give example for any three of them. (4 Marks)

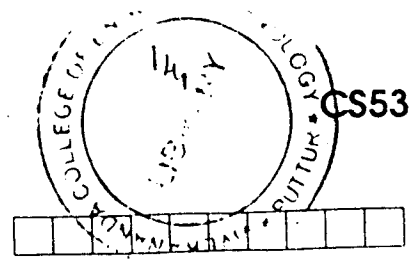
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4. (a) Bring out different clauses of SELECT-FROM-WHERE statement. Give example for 3 types. (8 Marks)
- (b) What is the significance of views in SQL? Give SQL statement to update data. (6 Marks)
- (c) Use the schema shown in question 3.b and answer the queries using SQL (for the first three only). (6 Marks)
5. (a) What are the anomalies if the proper design of a database is not carried out? Illustrate them with an example for each type. (6 Marks)
- (b) Give different inference rules of functional dependencies. (6 Marks)
- (c) Give the algorithm to check dependency preservation and lossless join. (8 Marks)
6. (a) Define the following terms :  
4NF, BCNF, inclusion dependency, DKNF, template dependency, 5 NF. (6 Marks)
- (b) Compare discretionary access control with mandatory access control. (8 Marks)
- (c) Explain how strict 2-phase locking is implemented. Show them with an example. (6 Marks)
7. (a) What are the 3 properties of a transaction specified in SQL for locking? Define each of them. (5 Marks)
- (b) Illustrate with an example how concurrency is controlled using a B+ tree. (10 Marks)
- (c) Highlight different activities involved in system crash recovery. (5 Marks)
8. Write short notes on :  
(a) ER to relational mapping  
(b) Embedded SQL  
(c) ACID properties  
(d) Write ahead lock. (4×5=20 Marks)

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NEW SCHEME



Reg. No.

**Fifth Semester B.E. Degree Examination, January/February 2006**  
**Computer Science/Information Science Engineering**  
**Database Management Systems**

Time: 3 hrs.)

(Max.Marks : 100

**Note:** Answer any FIVE full questions.

1. (a) A bank has many branches, the bank has many customers. A customer can open many different kinds of accounts with the bank. Any customer of the bank can take loan from the bank. All branches can give loans. Banks have also installed automatic teller machines, from which a customer can withdraw from his/her bank. Draw the ER diagram for the bank. Create 3 NF tables of your design. Make suitable assumptions, if any. (10 Marks)
- (b) Describe the various functions which are required to be performed by the database administrator. (5 Marks)
- (c) What are the disadvantages of database system? Explain them briefly. (5 Marks)
2. (a) What is a participation role? When is it necessary to use role names in the description of relationship types? (8 Marks)
- (b) Discuss the naming convention used for ER schema diagram. (7 Marks)
- (c) What is the FUNCTION operation? What is it used for? (5 Marks)
3. (a) In relational algebra, discuss some types of queries for which renaming is necessary in order to specify the query unambiguously. (5 Marks)
- (b) Consider the two tables  $T_1$  and  $T_2$  show the result of the following operations : (15 Marks)
  - i)  $T_1 \bowtie_{T_1.P=T_2.A} T_2$
  - ii)  $T_1 \bowtie_{T_1.Q=T_2.B} T_2$
  - iii)  $T_1 \Rightarrow \bowtie_{T_1.P=T_2.A} T_2$
  - iv)  $T_1 \bowtie_{\neq T_1.Q=T_2.B} T_2$
  - v)  $T_1 \cup T_2$
  - vi)  $T_1 \bowtie_{(T_1.P=T_2.A \text{ and } T_1.R=T_2.C)} T_2$

Table  $T_1$

P	Q	R
10	a	5
15	b	8
25	a	6

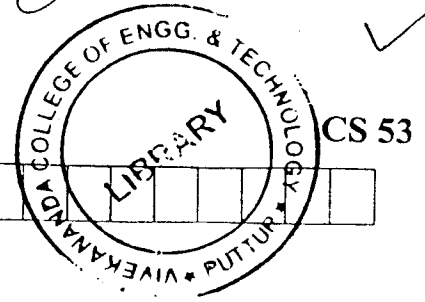
Table  $T_2$

A	B	C
10	b	6
15	c	3
10	b	5

Contd.... 2

4. (a) Consider the following relations for a database that keeps track of business trips of sales persons in a sales office.  
SAILORS (SID, SNAME, RATING, AGE)  
BOATS (BID, BNAME, COLOR)  
RESERVES (SID, BID, DAY)
- Specify the following queries in SQL and in relational algebra.
- Find the names of sailors who have reserved a red boat.
  - Find the names of sailors who have reserved a red or a green boat.
  - Find the names of sailors who have reserved all boats called 'Interlake'.
- (12 Marks)
- (b) How do the relations (tables) in SQL differ from the relations defined formally? Discuss the differences in terminology. Why does SQL allow duplicate tuples in a table or in a query result?  
(8 Marks)
5. (a) Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with examples.  
(9 Marks)
- (b) Consider the universal relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies  
 $F = \{A, B \rightarrow C, A \rightarrow D, E, B \rightarrow F, F \rightarrow G, H, D \rightarrow I, j\}$ .  
What is the key for R? Decompose R into 2NF, then 3NF relations.  
(8 Marks)
- (c) Discuss the problem of spurious tuples and how we may prevent it.  
(3 Marks)
6. (a) What is serialisability? How can serialisability be ensured? Do you need to restrict concurrent execution of transaction to ensure serialisability? Justify your answer. Give an example of transactions and how you can force serialisability in those transactions.  
(10 Marks)
- (b) What are the steps one must take with its database management system, in order to ensure disaster recovery? Define the process of recovery in case of disaster.  
(10 Marks)
7. (a) What is two phase locking? Describe with help of an example. Will two phase locking result in serialisable schedule? Will two phase locking result in deadlock? Justify your answer with the help of an example.  
(10 Marks)
- (b) What is shadow paging scheme? Where is it used?  
(5 Marks)
- (c) What is the multi-version technique of concurrency control? Describe with the help of an example. Will this scheme result in rollback and/or deadlock? Justify your answer.  
(5 Marks)
8. (a) What is time stamping? Explain a mechanism of concurrency control that uses time stamping with the help of an example.  
(10 Marks)
- (b) What is intention mode locking? Describe the various intention mode locks with the help of an example.  
(10 Marks)

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**NEW SCHEME**

**Fifth Semester B.E. Degree Examination, July 2006  
CSE / ISE**

**Database Management Systems**

Time: 3 hrs.]

[Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. With a diagram explain the architecture of DBMS. (06 Marks)  
b. What are the advantages of DBMS? (04 Marks)  
c. Explain with sketch, the different phases of database design. (10 Marks)
- 2 a. Define the following : i) Entity ii) Primary key iii) Multivalued attribute  
b. iv) Cardinality ratio v) Foreign key. (10 Marks)  
c. Write an ER diagram for Banking system. Assume your own entities ( minimum 5 entities ), attributes and relations. Mention cardinality ratio. (10 Marks)
- 3 a. Consider the following schema for a company database  
EMPLOYEE ( Name, SSN, Address, Sex, Salary, Dno)  
DEPARTMENT ( DName, Dnumber, MGRSSN )  
DEPARTMENT\_LOCATIONS ( Dnumber, Dlocations)  
Project ( Pname, Pnumber, Plocation, Dnum )  
Works-on ( ESSN, PNO, Hours )  
Dependent ( ESSN, Dependent\_name, Sex, Relationship)  
Write the queries in Relational Algebra to  
i) Retrieve the name and address to all employees who work for the Design department.  
ii) Find the names of the employees who work on all projects controlled by department number 2.  
iii) List all the projects on which employee Raghu is working.  
iv) Retrieve the names of employees who have no dependents. (10 Marks)  
b. Give the ER to Relational mapping algorithm. Discuss each steps with an examples. (10 Marks)
- 4 a. Discuss the following relational algebra operations Illustrate with an example for each. UNION, SELECT, PROJECT, JOIN. (10 Marks)  
b. Consider the two tables T1 and T2.

P	Q	R
10	a	5
15	b	8
25	a	6

A	B	C
10	b	6
25	c	3
10	b	5

Show the result of the following operations :

- i)  $T1 \bowtie_{T1.P=T2.A} T2$
- ii)  $T1 \bowtie_{T1.Q=T2.B} T2$
- iii)  $T1 \bowtie_{T1.P=T2.A} T2$
- iv)  $T1 \bowtie_{T1.Q=T2.B} T2$
- v)  $T1 \bowtie_{(T1.P=T2.A \text{ and } T1.R=T2.C)} T2$

(10 Marks)

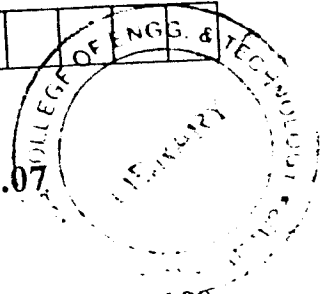
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- 5 a. Consider the following relational database schema  
Student ( Student\_id, Sname, Major, GPA )  
Faculty ( Faculty\_id, fname, dept, designation, salary )  
Course ( Course\_id, Cname, Faculty\_id )  
Enrol ( Course\_id, Student\_id, grade )  
Write the following queries in SQL.
- List the names of all students enrolled for the course "CS – 53"
  - List the names of students enrolled for the course "CS-53" and have received "A" grade.
  - List all the departments having an average salary of above Rs 20,000.
  - Give a 15% raise to salary of all faculty.
  - List the names of all faculty members beginning with "R" and ending with letter "U" (10 Marks)
- b. List the data type that are allowed for SQL attributes. (04 Marks)
- c. Briefly explain the following with respect to SQL giving example. (06 Marks)
- Views
  - Aggregate functions.
- 6 a. State the informal guide lines for relational schema design? Illustrate how violation of these guide lines may be harmful. (10 Marks)
- b. What is a set of functional dependencies F said to be minimal? Give an algorithm for finding a minimal cover G for F. (06 Marks)
- c. Explain 3NF in detail with an example. (04 Marks)
- 7 a. Explain briefly the Domain key normal form with an example. (06 Marks)
- b. Why concurrency control is needed? (05 Marks)
- c. List the account level privileges provided to use database system. (04 Marks)
- d. Discuss mandatory access control for multi level security. (05 Marks)
- 8 a. Explain the shadow paging recovery technique. (08 Marks)
- b. What is time strap? How does the system generate time strap. (08 Marks)
- c. Discuss ACID properties. (04 Marks)

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**NEW SCHEME**

Fifth Semester B.E. Degree Examination, Dec.06 / Jan.07  
CS / IS



**Database Management Systems**

[Max. Marks:100]

Time: 3 hrs.]

Note: I. Answer any FIVE full questions.

- 1 a. Discuss the main characteristics of the database approach and how it differs from traditional file system. (10 Marks)
- b. Define the following terms :
  - i) Database
  - ii) DBMS
  - iii) Program data independence
  - iv) Meta data
  - v) Canned transaction. (10 Marks)
- 2 a. Discuss the main categories of data model. (06 Marks)
- b. Describe the three schema architecture with block diagrams. Why do we need mappings between schema levels? (08 Marks)
- c. Discuss the different types of user friendly interfaces. Mention different types of users. (06 Marks)
- 3 a. Consider the ER diagram in figure Q3 (a). Assume that an employee may work upto two departments, but may also be not assigned to any department. Assume that each department must have one and may have up to three phone numbers. Supply (min, max) constraints on this diagram. State clearly any additional assumptions you make. (06 Marks)

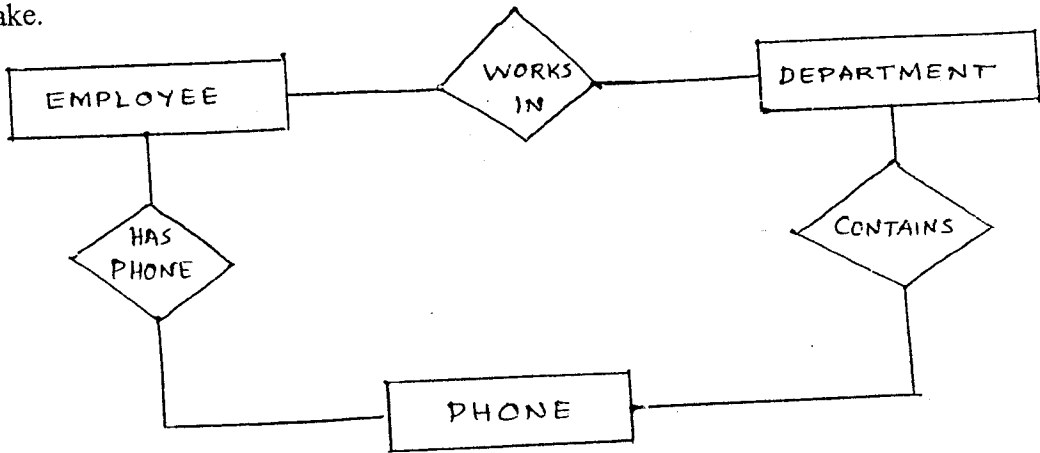


Fig. Q3 (a)

- b. A database is being constructed to keep track of the teams and games of a sports league. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game and the result of the game. Design an ER diagram for this application, stating any assumptions you make. Convert the ER diagram into tables applying mapping algorithm. (10 Marks)
- c. How to convert ER diagram into relational model? Explain. (04 Marks)

Contd...2

- 4 a. What is a complete set of relational algebra operators? Derive the other operators used in relational algebra using the complete set. (10 Marks)
- b. Consider the following two tables  $T_1$  and  $T_2$ , show the result of the following operations.

**Table  $T_1$**

P	Q	R
10	a	5
15	b	8
25	a	6

**Table  $T_2$**

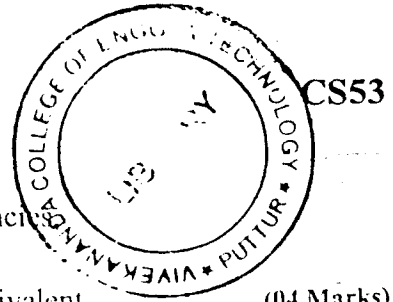
A	B	C
10	b	6
25	c	3
10	b	5

- i)  $T_1 \bowtie_{T_1.P = T_2.A} T_2$
- ii)  $T_1 \bowtie_{T_1.Q = T_2.B} T_2$
- iii)  $T_1 \bowtie_{T_1.P = T_2.A} T_2$
- iv)  $T_1 \bowtie_{T_1.Q = T_2.B} T_2$
- v)  $T_1 \cup T_2$

(10 Marks)

- 5 a. Explain co-related queries with an example. (05 Marks)
- b. How does SQL allow implementation of the entity integrity and referential integrity constraints? (05 Marks)
- c. For the database schema, given below
- Student (Name, Student number, Class, Major)
  - Course (Course name, Course number, Credit-hrs, Department)
  - Section (Sec ID, Course number, Semester, Year, Instructor)
  - Grade report (Student number, Sec ID, Grade)
  - Prerequisite (Course number, Prerequisite number)
- Specify the following queries in SQL.
- i) Retrieve the names of all senior student (above class = 7) majoring in 'CS'.
  - ii) Retrieve the names of all courses taught by professor keng in 1998 and 1999.
  - iii) For each section taught by professor Keng, retrieve the course number, credit hours, course name, semester, year and the number of students who took the section. (10 Marks)

- 6 a. Discuss insertion, deletion and modification anomalies. Why are they considered bad? Illustrate with an example for each. (10 Marks)
- b. Define Boyce-Codd normal form. How does it differ from 3 NF? Why is it considered a stronger form of a 3NF. (06 Marks)
- c. Discuss the problem of spurious tuples and how we may prevent it. (04 Marks)



- 7 a. Consider the following two sets of functional dependencies  
 $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$  and  
 $G = \{A \rightarrow CD, E \rightarrow AH\}$ . check whether they are equivalent. (04 Marks)
- b. Consider the universal relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and a set of functional dependencies  $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$ . Find the following :
- Key for R.
  - Determine the decomposition.  
 $D = \{R_1, R_2, R_3, R_4, R_5\};$   
 $R_1 = \{A, B, C\}, R_2 = \{A, D, E\}, R_3 = \{B, F\}, R_4 = \{F, G, H\}, R_5 = \{D, I, J\}$   
is lossless join decomposition. (06 Marks)
- c. Draw a state diagram, and discuss the typical states that a transaction goes through during execution. (05 Marks)
- d. Discuss the acid property of transactional database. (05 Marks)
- 8 a. Explain the various operations used in binary locks. Discuss the advantages and disadvantages of binary lock. (06 Marks)
- b. Explain aries recovery algorithm with an example. (10 Marks)
- c. Explain transaction rollback used in recovery. (04 Marks)

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**NEW SCHEME**

**Fifth Semester B.E. Degree Examination, July 2007**  
**CS / IS**

**Database Management Systems**

Time: 3 hrs.]

[Max. Marks:100

**Note :1. Answer any FIVE full questions.****2. Diagrams if any must be neatly drawn.**

- 1
  - a. Bring out the important advantages and disadvantages of DBMS over file system. (06 Marks)
  - b. With a neat block diagram, explain the DBMS architecture. Also discuss three different levels of abstraction. (10 Marks)
  - c. What are the responsibilities of a DBA? (04 Marks)
  
- 2
  - a. Define Entity, Entity set, attribute with respect to ER model. List different types of attributes along with their symbol. (08 Marks)
  - b. Describe the data pertaining to an insurance company using ER model concepts. Assume suitable entity types like CUSTOMER, AGENT, BRANCH, POLICIES, PAYMENT-DETAILS etc. and the relationship between them. (08 Marks)
  - c. What is cardinality ratio? What are the different types of cardinality ratio in a binary relationship? (04 Marks)
  
- 3
  - a. Define the terms: domain, relation schema, relation state, relational database schema with an example for each. (08 Marks)
  - b. Discuss the entity integrity and referential integrity constraints. Why is each considered important? (06 Marks)
  - c. With an example, explain different set operations in relational algebra. (06 Marks)
  
- 4
  - a. Explain 1NF, 2NF and 3NF with an example for each. (10 Marks)
  - b. List and explain the SQL commands available for retrieving and updating the tables in a database. Command of retrieval must contain all possible clauses. (10 Marks)
  
- 5
  - a. Define the following terms with examples:
    - i) Candidate key.
    - ii) Super key.
    - iii) Foreign key.
    - iv) Prime attribute.
    - v) Key constraint. (10 Marks)
  - b. Consider the following relations of a database that keeps track of business trips of sales persons.  
 SALESPERSON (SSN, Name, Start-Year, SEX, Dept-No.)  
 TRIP (SSN, FROM-CITY, TO-CITY, Dep-Date, Ret-Date, Trip-id, Description)  
 EXPENSE (Trip-id, Account-No., Amount, Remarks)  
 Specify foreign keys and identify functional dependencies. (06 Marks)
  - c. Explain with an example Equi-join and Natural join. (04 Marks)

Contd....2

- 6 a. Describe the six clauses of SQL query statement and show what expressions or relations can be specified in each of the six clauses. (06 Marks)
- b. Explain different aggregate functions available in SQL with an example. (08 Marks)
- c. Explain the term security policy and security mechanism. Also show how to grant, revoke and delegate permissions on objects with an example for each. (06 Marks)
- 7 a. Discuss the ACID properties of a database transaction. (06 Marks)
- b. What is schedule? Illustrate with an example. Define the concept of recoverable, cascadeless and strict schedules. (06 Marks)
- c. Discuss the problem of deadlock and starvation. Explain different approaches in dealing with these problems. (08 Marks)
- 8 Write short notes on:
- a. Embedded SQL.
- b. Two-phase locking.
- c. Functional and multi-valued dependencies.
- d. Write ahead log protocol. (20 Marks)

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**Fifth Semester B.E. Degree Examination, Dec. 07 / Jan. 08**  
**Database Management Systems**

Time: 3 hrs.

Max. Marks: 100

**Note : Answer any FIVE full questions.**

1. a. With a diagram explain the architecture of DBMS. (06 Marks)  
b. What are the disadvantages of data base system? Explain them briefly. (04 Marks)  
c. Define the following terms.  
i) DBMS, ii) DBA, iii) Meta data, iv) Entity, v) Attribute. (10 Marks)
2. a. Explain with sketch, the different phases of database design. (10 Marks)  
b. Write on E-R diagram for a banking system. Assume your own entities (minimum 5 entities) attributes and relations, mention cardinality ratio. (10 Marks)
3. a. Define the following terms with an example for each.  
i) Candidate key, ii) Primary key, iii) Foreign key, iv) Super key. (10 Marks)  
b. Give the E-R to relational mapping algorithm. Discuss each step with an example. (10 Marks)
4. a. Discuss the following relational algebra operations. Illustrate, them with an example for each :  
SELECT, PROJECT, DIFFERENCE, AND UNION. (12 Marks)  
b. Consider the following schema for a company database –  
Employee (Name, SSN, Address, Sex, Salary, Dno.)  
Department (Dname, Dnumber, MGR SSN, MGRSTART DATE)  
Dept. Location (Dnumber, Dlocations)  
Project (Pname, Pnumber, Plocation, Dnum)  
Works-on (ESSN, Pno, Hours)  
Dependent (ESSN, Dependent-name, Sex, Ddate, Relationship)  
Write the queries in relational algebra to  
i) Retrieve the name and address of all employees who work for the research department.  
ii) Find the names of the employees who work on all projects controlled by department number 5  
iii) List all the projects on which employee Smith is working  
iv) Retrieve the names of employees who have no dependents. (08 Marks)
5. a. List and explain the commands available for retrieving and updating the database in SQL. (08 Marks)  
b. Briefly explain the following with respect to SQL, giving example.  
i) Joins, ii) Views, iii) Aggregate functions, iii) Correlated queries. (12 Marks)
6. a. What is the need for normalization? Explain the first, second and third normal forms, with example. (14 Marks)  
b. Define Boyce-Codd normal form, how does it differ from 3 NF? Why is it considered a stronger form of a 3NF? (06 Marks)
7. a. Explain properties of a transaction with state transition diagram. (10 Marks)  
b. With an algorithm explain 2-phase locking. (10 Marks)
8. a. What is time stamping? Explain a mechanism of concurrency control that uses time stamping with the help of an example. (10 Marks)  
b. Explain the database recovery techniques. (10 Marks)

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**Fifth Semester B.E. Degree Examination, Dec.08/Jan.09**

**Database Management Systems**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting at least TWO questions from each part.**

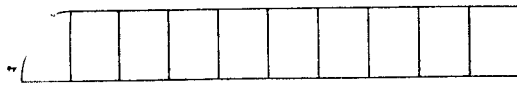
**PART – A**

- 1 a. List advantages of DBMS over traditional file systems. Briefly explain them. (08 Marks)
- b. Define and explain the importance of database catalog. Explain the internal storage format of a catalog with an example. (06 Marks)
- c. Describe the three schema architecture. What are the problems associated with three schema architecture. (06 Marks)
- 2 a. Discuss concepts related to structural constraints of a relationship type with examples. (10 Marks)
- b. Design an E-R diagram for keeping track of information about a hospital database taking into account at least entities. (10 Marks)
- a. Explain the need of primary and foreign keys with suitable examples. (04 Marks)
- b. Explain the division operator with an example. How can a division operator be implemented using other relational algebraic operators? (04 Marks)
- c. Consider the following schema for a company database:  
Employee (Name, SSN, Salary, DNo, SuperSSN)  
Department (DName, DNos, MGRSSN)  
Project (Pname, Pnumber, DNum )  
Works ON ( ESSN, PNo, Hours)  
Dependent (ESSN, Dependent-name, Sex)  
Write the queries in relational algebra to  
(i) List the name of all employees with at least two dependents.  
(ii) Find the name of employees who work on all the projects controlled by department 5  
(iii) Retrieve the name of managers who do not have female dependents. (12 Marks)
- 4 a. Explain the ALTER TABLE command. Explain how a new constraint can be added and also an existing constraint can be removed using suitable examples. (08 Marks)
- b. Using the same tables given in Q.NO.3(c), write SQL queries to:  
(i) Retrieve the name of employees who are paid the same salary as that of RAJ.  
(ii) Retrieve the name of employees who have two or more dependents.  
(iii) Retrieve the name of employees and their SuperSSN name. (12 Marks)

**PART – B**

- 5 a. How are triggers and assertions defined in SQL? Explain with examples. (10 Marks)
- b. Give an example of declaring a C language data type in SQL and explain it. (10 Marks)
- 6 a. Which normal form is based on the concept of full functional dependency? Explain the same with an example. (08 Marks)
- b. A relation R has four attributes ABCD. For each of the following sets of FD, identify the candidate key and the highest normal form:  
(i)  $C \rightarrow D, C \rightarrow A, B \rightarrow C$  (ii)  $B \rightarrow C, D \rightarrow A$  (iii)  $ABC \rightarrow D, D \rightarrow A$  (12 Marks)
- 7 a. Define multivalued dependency. Explain 4NF with an example. (10 Marks)
- b. Explain all the phases involved in ARIES algorithm with an example. (10 Marks)
- 8 Write short notes on: (20 Marks)
  - a. Two phase locking protocol
  - b. Write ahead log protocol
  - c. Time stamp ordering algorithm
  - d. Transaction support in SQL.





**Fifth Semester B.E. Degree Examination, June-July 2009**

**Database Management System**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions  
choosing at least two from each part.**

**Part A**

- 1 a. Define the following terms:  
i) Database                      ii) Canned transaction                      iii) Data model  
iv) Metadata                      v) Database designer.                      (10 Marks)
- b. Explain characteristic of the database approach.                      (05 Marks)
- c. What are the responsibilities of database administrators?                      (05 Marks)
- 2 a. List the summary of the notations for ER diagrams. Include symbols used in ER diagrams and their meanings.                      (10 Marks)
- b. With respect to ER model, explain with examples,  
i) Strong entity                      ii) Weak entity                      iii) Participation constraints  
iv) Cardinality ratio                      v) Recurring relationships.                      (10 Marks)
- 3 a. Define the following terms with an example for each,  
i) Super key                      ii) Domain                      iii) Tuple                      iv) Nulls  
v) A relational database schema S.                      vi) The Entity integrity constraint.                      (12 Marks)
- b. Explain : i) Domain constraints                      ii) Semantic integrity constraints  
iii) Functional dependency constraint with examples.                      (08 Marks)
- 4 a. Given the schema  
EMP (Fname, Lname, SSN, Bdate, Address, Sex, Salary, SuperSSN, DNo)  
DEPT(Dname, Dnumber, MgrSSN, Mgrstartdate)  
DEPT-LOC(Dnumber, Dloc), Project(Pname, Pnumber, Ploc, Dnum)  
WORKS-ON(ESSN, PNO, Hours)  
Give the relation algebra expression for the following:  
i) List female employees from DNo = 20 earning more than 50000.  
ii) List 'CSE' department details.  
iii) Retrieve the first name, last name and salary of all employees who work in department number 50.  
iv) Retrieve the name of the manager of each department.  
v) Retrieve the name and address of all employees who work for the sports department.  
vi) Retrieve the names of employees who have no dependents.                      (12 Marks)
- b. With respect to SQL, explain with example  
i) The drop command  
ii) The alter command.                      (08 Marks)

**Part B**

- 5 a. Explain Insert, Delete and Update statements in SQL with example.                      (08 Marks)
- b. Write a note on Aggregate functions in SQL with examples.                      (12 Marks)
- 6 a. What is the need for normalization? Explain the first, second and third normal forms with examples.                      (14 Marks)
- b. Explain informal design guidelines for relation schemas.                      (06 Marks)
- 7 a. Explain multivalued dependency and fourth normal form (4NF) with examples.                      (10 Marks)
- b. Explain i) Inclusion dependencies                      ii) Domain key normal form.                      (10 Marks)
- 8 a. Explain properties of a transaction with state transition diagram.                      (10 Marks)
- b. What is a schedule? Explain with examples serial, nonserial and conflict serializable schedules.                      (10 Marks)

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**Fifth Semester B.E. Degree Examination, Dec.09/Jan.10**  
**Database Management Systems**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. Explain the typical components of a DBMS with a neat diagram. (10 Marks)
- b. Define and explain the following terms with an example each :  
i) Snapshot ii) Intension iii) Extension iv) Schema construct (05 Marks)
- c. What is meant by “persistent storage for program objects”? Explain. (05 Marks)
- 2 a. Explain how role names are assigned in case of recursive relationships? Illustrate this concept with a diagram. (06 Marks)
- b. What is meant by partial key? Explain. (04 Marks)
- c. Design an ER diagram for keeping track of information about an AIRLINE database taking into account at least six entities. (10 Marks)
- 3 a. Define referential integrity constraint. Explain the importance of referential integrity constraint. How is this constraint implemented in SQL? (08 Marks)
- b. Consider the following relations and write relational algebra queries:  
Employee ( Fname, SSN, Salary, Super-SSN, DNo) ; Works ON (ESSN, PNO, hours) ;  
Department (Dname, Dnumber, Mgr-SSN) ; Dependent (ESSN, Dependent name)  
i) Retrieve the highest salary paid in each department.  
ii) Retrieve the name of managers who have more than two dependents.  
iii) Retrieve the number of employee’s and their average salary working in each department. (12 Marks)
- 4 a. Explain IN and EXISTS operators with suitable examples. (08 Marks)
- b. Consider the same data given in Q3(b), and write the following queries in SQL:  
i) Retrieve the name of all employees who do not have supervisor.  
ii) Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.  
iii) Retrieve the SSN of all employees who work on project numbers 1, 2, 3. (12 Marks)

**PART – B**

- 5 a. How is a view created and dropped? What problems are associated with updating of views? (10 Marks)
- b. What is embedded SQL? With an example, illustrate how would you connect to a database, fetch records and display. Also explain the concept of stored procedure in brief. (10 Marks)
- 6 a. Which normal form is based on the concept of transitive functional dependency? Explain with an example the decomposition into 3NF. (10 Marks)
- b. Define multi valued dependency. Explain 4NF with an example. (10 Marks)
- 7 a. Explain the three phases involved in an ARIES algorithm with an appropriate example. (10 Marks)
- b. Given a relation R with four attributes  $R = \{A B C D\}$  and the following FD, identify the candidate keys for R and the highest normal form.  
i)  $C \rightarrow D, C \rightarrow A, B \rightarrow C$  ii)  $B \rightarrow C, D \rightarrow A$  (10 Marks)
- 8 Write short notes on :  
a. Two phase locking protocol b. Transaction support in SQL  
c. Write ahead log protocol d. Time stamp ordering algorithm (20 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 4, 5, = 50, will be treated as malpractice.



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**Fifth Semester B.E. Degree Examination, May/June 2010**  
**Database Management Systems**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting at least TWO questions from each part.**

**PART - A**

- 1 a. Briefly discuss the advantages of using the DBMS. (10 Marks)  
b. Explain the component modules of DBMS and their interaction, with the help of a diagram. (10 Marks)
- 2 a. Define an entity and an attribute. Explain the different types of attributes that occur in an ER model, with an example. (10 Marks)  
b. Define the following with an example: (10 Marks)
  - i) Weak entity type
  - ii) Participation constraints
  - iii) Cardinality ratio
  - iv) Ternary relationship
  - v) Recursive relationship.
- 3 a. Discuss the characteristics of a relation, with examples. (08 Marks)  
b. Briefly discuss the different types of update operations on relational database. Show an example of a violation of the referential integrity in each of the update operation. (09 Marks)  
c. What is a valid state and an invalid state, with respect to a database? (03 Marks)
- 4 a. Consider the following two tables T<sub>1</sub> and T<sub>2</sub>. Show the results of the following operations: (10 Marks)
  - i)  $T_1 \bowtie_{T_1.P=T_2.A} T_2$
  - ii)  $T_1 \bowtie_{T_1.Q=T_2.B} T_2$
  - iii)  $T_1 \bowtie_{T_1.P=T_2.A} T_2$
  - iv)  $T_1 \bowtie_{(T_1.P = T_2.A \text{ AND } T_1.R = T_2.C)} T_2$
  - v)  $T_1 \cup T_2$ .

(Assume T<sub>1</sub> and T<sub>2</sub> are union compatible).

Table T <sub>1</sub>			Table T <sub>2</sub>		
P	Q	R	A	B	C
10	a	5	10	b	6
15	b	8	25	c	3
25	a	6	10	b	5

- b. Explain with an example, the basic constraints that can be specified, when you create a table in SQL. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

## PART – B

- 5 a. Explain the syntax of a SELECT statement in SQL. Write the SQL query for the following relation algebra expression.  
 $\sigma_{Bdate, Address}(\sigma_{Fname = 'John' \text{ AND } Minit = 'B' \text{ AND } Lname = 'Smith'}(EMPLOYEE))$   
 (06 Marks)
- b. Explain DROP command with an example. (04 Marks)
- c. Consider the following tables:  
 WORKS (Pname, Cname, Salary)  
 LIVES (Pname, Street, City)  
 LOCATED-IN (Cname, City)  
 MANAGER (Pname, mgrname)  
 Write the SQL query for the following:
- Find the names of all persons who live in the city 'Mumbai'.
  - Retrieve the names of all person of 'Infosis' whose salary is between Rs.30,000 and Rs.50,000.
  - Find the names of all persons who live and work in the same city.
  - List the names of the people who work for 'Wipro' along with the cities they live in.
  - Find the average salary of all 'Infosians'.
- (10 Marks)
- 6 a. What is a functional dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (10 Marks)
- b. What is the need for normalization? Explain second normal form. Consider the relation EMP-PROJ = {SSn, Pnumber, Hours, Ename, Pname, Plocation}. Assume {SSn, Pnumber} as primary key. The dependencies are  
 $SSn \text{ Pnumber} \rightarrow \{Hours\}$   
 $SSn \rightarrow \{Ename\}$   
 $Pnumber \rightarrow \{Pname, Plocation\}$ .  
 Normalize the above relation into 2NF. (10 Marks)
- 7 a. Explain multivalued dependency and fourth normal form, with an example. (10 Marks)
- b. Let  $R = \{SSn, Ename, Pnumber, Pname, Plocation, Hours\}$  and  $D = \{R_1, R_2, R_3\}$ , where  
 $R_1 = EMP = \{SSn, Ename\}$   
 $R_2 = PROJ = \{Pnumber, Pname, Plocation\}$   
 $R_3 = WORK-ON = \{SSn, Pnumber, Hours\}$ .  
 The following functional dependencies hold on relation R.  
 $F = \{SSn \rightarrow Ename ;$   
 $\quad Pnumber \rightarrow \{Pname, Plocation\};$   
 $\quad \{SSn, Pnumber\} \rightarrow Hours\}$ .  
 Prove that the above decomposition of relation R has the lossless join property. (10 Marks)
- 8 a. Explain the problems that can occur when concurrent transactions are executed. Give examples. (10 Marks)
- b. Briefly discuss the two phase locking protocol used in concurrency control. (10 Marks)

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