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POKHARA UNIVERSITY

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Level: Bachelor      Semester - Spring      Year : 2003  
Programme: BE      Full Marks : 100  
Course: Database Systems      Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Describe the three levels of architecture in DBMS design.  
b) Explain additional operators involved in relational algebra.  
c) What is relational comparison? Write down the available relational comparison
2. a) What is a transaction? Explain about ACID property.  
b) What are the features of SQL? Differentiate between SQL and Embedded SQL.
3. a) What is view? Explain the view update operation in brief.  
b) Define the term transition. Differentiate between static and dynamic transition constraints.
4. a) What do you mean by normalization and why is it important? Consider the table given below. Recognize the normal form and higher form of table in which it can be converted.

Order No.	Order Date	Patch No.	Qty. Ordered
Ord- 1	6 June 1986	P1	10
Ord- 1	6 June 1986	P6	20
Ord-2	3 May 1986	P5	10
Ord-2	3 May 1986	P6	50
Ord-2	2 May 1986	P2	30

- b) What are functional dependencies? Explain the closure set of functional dependencies.
5. a) What is concurrency? What are the two phase of "Two-phase Commit" protocol?  
b) What is locking? Explain the types of locking available.

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6. a) Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played the score in each match, the players in each match and individual statistics for each match.
- b) Consider the employee database of the following figure, where the primary keys are underlined. Write the expression in SQL for each of the following queries.
- employee (employee-name, street, city)  
works (employee-name, company-name, salary)  
company (company-name, city)  
manages (employee-name, manager-name)
- Find the names and cities of residence of all employees who worked for First Bank Corporation.
  - Find the name, street address and cities of residence of all employees who worked for First Bank Corporation and earn more than \$ 10,000.
  - Find all the employees in the database who do not work for First Bank Corporation.
  - Find all employees in the database who earn more than each employee of Small Bank Corporation.
  - Give all managers of First Bank Corporation a 10 percent raise unless the salary becomes greater than \$ 100,00; in such case, give only a 3 percent raise.
7. Write short notes on (*Any Two*):

- Data Encryption
- Relational Algebra Vs Relational Calculus
- Snapshots

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## POKHARA UNIVERSITY

Level: Bachelor      Semester – Spring      Year : 2004  
Programme: BE      Full Marks : 100  
Course: Database System      Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Why as a database system designer we always focus on “three layer architecture”. Explain with proper reasoning. 7
- b) Draw an E-R diagram for car insurance company showing cardinalities and primary key. In Insurance company, one person may have 1...n car. The cars may participate in zero or more accidents. 8
2. a) Differentiate between relational algebra and relational calculus. 7  
    Describe the additional operators for relational algebra.  
b) Write SQL statement for following queries for given database schema. 8  
    employee{ employee\_id, ename, address, status, salary}  
    works {employee\_id, dept\_id}  
    department{dept\_id, dname, address}  
    i) Find the total number of employee working in Baneshwor Branch.  
    ii) Find the number of employee in each department.  
    iii) List the name of managers in each department.  
    iv) Add the attribute “phone\_number” for the relation employee.
3. a) Explain all four types of constraints. 8  
b) What is a relation? What do you mean by relvars? Do we have anything common in relation and relvars? 7
4. a) What is the Golden Rule associated with the view updates. Also write down five principles associated with view update. 7  
b) What do you mean by Transaction? Explain with example the ACID property associated with the transaction. 8
5. a) Classify all types of failure that you know with reference to suitable example. 7  
b) Explain in details Locks and its type and explain the working of two phase locking protocol. 8
6. a) Bill\_Shcema{salesno, Customer\_Id, Name, Address, Phoneno. Book Id, Book Name, Publisher, Price, Quantity} 10  
    Business Rules:  
    i) Single person can buy many books.  
    ii) A book may be published by various publishers.

In which Normal Form is the table? Convert this table up to Third Normal Form.

- b) What is Functional dependency? Mention the transitivity rule of functional dependency. 5
7. Write short notes on any two 2×5
- a) Statistical database
  - b) Deadlocks
  - c) Data encryption.

POKHARA UNIVERSITY

Level: Bachelor	Semester - Spring	Year : 2005
Programme: BE		Full Marks: 100
Course: Database Systems		Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) What are the advantages of Database System against the file system, explain it. 5
- b) Do you think distributed and parallel processing is same? Define the process of data communication in client server architecture. 5
- c) What do you mean by data independence? Define the three level architecture of database system with the help of diagram. 5
2. a) How does the relational tuple calculus differ with domain calculus? Compare the computational efficiency of relational algebra with relational calculus. 8
- b) What do you mean by relational variable? What are the properties of a relation? 7
3. Consider the database containing the given tables below: 15

Primary keys are underlined, appropriate foreign keys and composite primary keys are to be determined by yourself. Write SQL statements for the following queries.

Store (itemcode, itemname, itemprice, currentqty)

Salesmaster (billno, billdate)

Salesdetail (billno, itemcode, qty, price)

- a) to find the itemname of the item, whose itemprice is greater than 1000 and currentqty is less than 10.
- b) To fine the itemname of the item which has the largest itemprice of all.
- c) Increase the itemprice of the item by 10% whose itemcode is less than 1000 and by 20% whose itemcode is greater than 1000.
- d) Alter the table salesmaster to add a new column called paymode.
- e) Insert a set of data element to each table.

4. a) How does database protect data from authorized users? Define types of constraints with the help of examples. 8
- b) How data can be encrypted? Define the role of statistical database. 7
5. a) Why does relational database need normalization? Define 2NF and 3NF with suitable relations. 7
- b) Define trivial and non-trivial dependencies and compute closure set of dependencies from following FDs. 8
6. a) "Concurrency is unavoidable evil for distributed transaction", do you agree? If yes, define the two phase commit protocol. 8
- b) When does transaction failure occur? Describe other major failures. 7
7. Write Short notes on (Any Two): 2x5
- a) Serializability
  - b) Views
  - c) Snapshots

5 b)

$$A \rightarrow BC$$

$$AC \rightarrow D$$

$$D \rightarrow B$$

$$AB \rightarrow D$$

POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database System

Semester – Fall

Year : 2006  
Full Marks: 100  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) How does the database system differ with database? Define the major advantages of database system. 8
- b) Draw ER diagram for store which keeps the information about item, workers of organization and its transaction. 7
2. a) Differentiate between syntax and semantic of relational algebra with reference of basic and additional operators. 8
- b) What is relational calculus? Explain the tuple and domain calculus with their computational capabilities. 7
3. a) Write the SQL statement for following queries where the base relvar is student detail. 9

Roll No	Student Name	Address	Age	Faculty	Semester	Sex	Hostel Name	Bill Amount
1	Arun Thapa	Imadol-6	20	IT	V	Male	Makalu	10000
1	Bimal Thapa	Kalimati-13	19	Software	IV	Male	Everest	50000
2	Yam Baral	Imadol-6	22	IT	V	Male	Makalu	12000
2	Tara Devi	Kalimati-13	26	Software	IV	Female	Everest	14000
3	Aruna Lama	Kalimati-14	22	IT	V	Female	Everest	20000

1. List all the female student of semester IV from software faculty. 6
2. List all record of student in ascending order of age. 6
3. Find out the total, average, minimum and maximum due fee. 6
4. Count the number of students fee due in range from 10000 to 15000. 6
- b) What is a catalog? Are system catalog and catalog same? Define the internal process how data dictionary is managed. 6
4. a) What is data integrity? How does database protect data from authorized users? Define types of constraints with the help of examples. 8

- b) When a view can be used in database system? Differentiate between dynaset and snapshots. 5
5. a) What is functional dependencies? Explain the closure set of functional dependencies. 5
- b) Why is normalization essential in RDBMS? What is non-loss decomposition? Define the role of demoralization. 5
- c) What is BCNF? How does it solve the problem of functional dependency of candidate key? 5
6. a) What is transaction? Define the methods of system recovery. 5
- b) What do you mean by two-phase commit? Define the SQL statement and facilities. 5
- c) Concurrency is considered as necessary evil, why? List and explain three concurrency problems. 5
7. Write short notes on (Any Two): 2×5
- a) Type of attribute
  - b) Mandatory access control
  - c) Data Encryption

**POKHARA UNIVERSITY**

Level: Bachelor

Semester – Spring

Year : 2006

Programme: BE

Full Marks: 100

Course: Database System

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Define database and DBMS. Briefly, explain the different type of database user. 10
- b) What do you mean by database schema? Define super key, candidate key and primary key. 5
2. a) What do you mean by Relational Algebra? Explain the fundamental operations in Relational Algebra. 5
- b) From the following schema: 5
 

Depositor = (customer\_name, account\_number)

Borrower = (customer\_name, loan\_number)

Write the Relation Algebra to

  - Find all tuples of loan for amount >\$1200.
  - Find all customers who have both loan and account.
  - Find all customers who have an account but no loan.
- c) Write relational tuple calculus expression for question no. 2 (b). 5  
Write any two.
3. a) What are the properties of Relations? Define the terms tupl, domain, degree and cardinality by the help of relation. 5
- b) Write the SQL statements for the following queries by the reference of **wine\_cellar** relation. 10

SN#	Wine	Producer	Year	Bottles	Ready
1	Chardonnay	Bottlers	1997	10	1998
2	Chardonnay	Coca	1998	5	2000
3	Pinot Noir	Simi	1997	12	2001
4	Merlot	Cline	1991	10	1992
5	Zinfandel	Rafanelli	1994	5	1995

- i. Creates wine\_cellar schema.
- ii. Inserts record in wine\_cellar as above.
- iii. Lists all record which were ready 2000.
- iv. Changes wine name as Vodka produces by coca.
- v. Removes all record from database required more than 2 year to ready.

What is data integrity? Compare the features to handle the large database which constraint is applicable. *Over writing question*

- |       |  |           |
|-------|--|-----------|
| 4. a) | What do you mean by vies in DBMS? Explain the constraint under which a relation can be updated through view.   | 5         |
| b)    | Define database integrity. Classify the integrity constraints of Database.   | 5         |
| c)    | Describe Referential Integrity. Explain the state and transition constraints.  | 5         |
| 5. a) | An initial schema of a relation is given as:<br>Publisher_schema = (ISBN, Title, Pages, Publisher, Topic1, Topic2).<br>Normalized it into 1NF, 2NF and then 3NF. | 2+3<br>+3 |
| b)    | Define 3NF. Compare 3NF with BCNF.   | 7         |
| 6. a) | Describe ACID properties of transaction. What are the different transaction states?  | 5         |
| b)    | What do you mean by concurrency? Why concurrency control is essential?   | 5         |
| c)    | Describe the two-phase commit. Explain the function of the transaction statement;- <i>Begin, Commit, and Rollback</i> .  | 5         |
| 7.    | Write short notes on (Any Two):  | 5×2       |
| a)    | Access control   |           |
| b)    | Statistical database   |           |
| c)    | Tuple and domain relational calculus   |           |
| d)    | Optimization   |           |

**POKHARA UNIVERSITY**

Level: Bachelor      Semester – Fall      Year : 2007  
Programme: BE      Full Marks : 100  
Course: Database System      Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1.    a) With the help of diagram, explain three level architecture of database.      5  
      b) What are responsibilities of a database administrator?      5  
      c) What are relational operators? Explain the additional algebraic operators with their application.      5
2.    a) Explain the difference between relational calculus and relational algebra with example of each? Judge computational efficiency between these two.      7  
      b) Differentiate between:      8  
         i) Syntax verses Semantics  
         ii) Procedural SQL verses embedded SQL
3.    a) Write the SQL statement to get the output from the student relation with attributes  
         Roll\_no, SName, SAddress, SAge, Faculty, HostelName, BillAmount then  
         i) List all IT-female students of Kathmandu and Pokhara.  
         ii) List all Students who have BillAmount due in descending order.  
         iii) Compute the total BillAmount sexwise who read in semester IV and live in ‘Gantrantik’ Hostel.  
         iv) Remove an attribute Faculty from table including its data values.  
         v) Change the size of BillAmount of 10 spaces width.      5  
      b) How does catalog differ from data dictionary? Explain the Catalog and System. Catalog.      8
4.    a) How does data integrity differ with data security? Describe which type of constraint is applicable to handle the large database.      8  
      b) How does data view contrast with relation? Differentiate between      7

dynast with snapshots.

- |    |   |     |
|----|---|-----|
| 5. | a) What are the advantages and disadvantages of normalization of data?  | 5   |
|    | b) Define Boyce-codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?   | 5   |
|    | c) Define trivial and non-trivial dependencies and compute closure set of attributes and functional dependency from following:<br>$A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C, AC \rightarrow D.$ | 5   |
| 6. | a) Describe the two-phase commit protocol for multi-database transactions.  | 5   |
|    | b) What do you mean by failure? Define various types of failure with help of appropriate example.   | 10  |
| 7. | a) Statistical database   | 5×2 |
|    | b) Data Encryption  |     |
|    | c) Functional Dependency  |     |
|    | d) Client Server architecture   |     |

**POKHARA UNIVERSITY**

Level: Bachelor  
Programme: BE  
Course: Database System

Semester – Spring      Year : 2007  
Full Marks: 100  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) What are the major components of database manager? Explain briefly. 5
- b) A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BE, ME, etc.) within the framework of the modular system. The college provides a number of modules, each being characterised by its code, title, credit value, module leader, teaching staff and the department they come from. A module is co-ordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: some modules require pre-requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance. **Draw ER Diagram.** 10

2. Consider the following sample database. 15

S	S#	SNAME	STATUS	CITY	SP	S#	P#	QTY
	S1	Smith	10	London		S1	P1	300
	S2	Jones	10	Paris		S1	P2	200
	S3	Brown	10	Paris		S1	P3	400
	S4	Clark	20	London		S1	P4	200
	S5	Adams	30	Athens		S1	P5	100
						S1	P6	100
						#S2	P1	300
						S2	P2	400
						S2	P3	200
						S3	P2	200
						S4	P2	200
						S4	P4	300
						S4	P5	400

P	P#	PNAME	COLOR	WEIGHT	CITY
	P1	Nut	Red	12.0	London
	P2	Bolt	Green	17.0	Paris
	P3	Screw	Blue	17.0	Rome
	P4	Screw	Red	14.0	London
	P5	Cam	Blue	12.0	Paris
	P6	Coy	Red	19.0	London

The suppliers and parts database (sample values)

- FOR INTERNAL USE ONLY
- i. Give an expression in relational algebra for each of the following:
    - a. Get supplier names for suppliers who supply at least one red part
    - b. Get supplier names for suppliers who supply all parts
  - ii. Give an expression in SQL for each of the following:
    - a. Insert a new supplier S10 into table S. The name and city are Smith and New York respectively; the status is not yet known.
    - b. For each part supplied, get the part number and the total shipment quantity.
    - c. Create a view such that it consists of S#, STATUS, and CITY with STATUS not less than 15.
3. a) Differentiate between Tuple Relational Calculus. and Domain Relational Calculus. 7
- b) What is embedded SQL? Discuss different parts of embedded SQL and their feature. 8
4. a) What do you mean by candidate key? Differentiate between primary key and foreign key. Recognize relevant keys for the database given in Q.No. 2. 8
- b) What are integrity constraints? Describe the various methods to ensure integrity constraints. 7
5. a) Describe the importance of data normalization in database design. Also, illustrate the process of normalization (up to 3NF) with appropriate example. 8
- b) Draw a state diagram, and discuss the typical states that a transaction goes through during execution. 7
6. a) Define scheduler, Serializability and locking in concurrency control. Explain each of them in brief. 9
- b) Show that authorization systems based on Bell-La Padula model is safe. 6
7. Write short notes on (*Any Two*): 2×5
- a) Client Server Architecture
  - b) Functional dependency
  - c) Deadlock prevention
  - d) Snapshots

**POKHARA UNIVERSITY**

Level: Bachelor      Semester – Fall      Year : 2008  
Programme: BE      Full Marks: 100  
Course: Database System      Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Compare and contrast relational algebra and relational calculus. 8
- b) What do you mean by data independence? Explain its importance in database systems. 7
2. a) What is tuple relational calculus? What are the different types of relational operators used in RDBMS? Explain with examples. 8
- b) Define relational database. Explain relational model and relations. 7
3. a) Consider the following base relvars (relations): 10

employee (emp\_name, street, city)

works (emp\_name, company, salary)

company (comp\_name, city)

manages (emp\_name, mngr\_name)

Give the SQL statements for each of the following:

- i. Find employee names that lives in the city same as the company city
- ii. List employee detail who earns more than Rs. 17,000
- iii. Update address of Kiran to Sanepa, Lalitpur
- iv. Create view for which employee earns Rs. 18,000 or more
- v. Delete all employees for which manager name is null
- b) How does catalog differ from data dictionary? Explain the Catalog and System Catalog. 5
4. a) Define trivial and non-trivial dependencies and compute closure set of attributes and functional dependency from following. 7

$A \rightarrow BC$ ,  $B \rightarrow C$ ,  $A \rightarrow B$ ,  $AB \rightarrow C$ ,  $AC \rightarrow D$ .

- b) Describe the importance of data normalization in database design. Also illustrate the process of normalization (up to 3NF) with an appropriate example. 8
5. a) What are the different transaction states? Describe ACID properties of transaction. 8
- b) What do you mean by recovery? Discuss the different types of recovery. 7
6. a) What are the typical security classifications? Explain the Justification behind these rules for enforcing multilevel security. 7
- b) How does data integrity differ with data security? Describe which type of constraint is applicable to handle the large database. 8
7. Write short notes on *(Any Two)* 2×5
- a) Two phase commit protocol
  - b) Views
  - c) Data dictionary

## POKHARA UNIVERSITY

Level: Bachelor                                      Semester – Spring                              Year : 2008  
Programme: BE                                      Full Marks: 100  
Course: Database Systems                            Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Define the major advantages of database system. What are the main functions of database administrator? 7
- b) What ER diagram? Draw ER diagram for banking enterprise. Include Weak entity, Composite attribute, derived attribute and multi valued attribute. 8
2. a) What is relational algebra? Explain close, semi-join, extend and summarize with reference of tutorial D. 8
- b) Explain the features of SQL. Define embedded SQL with example. 7
3. Consider the following table

**Client\_master**

Column name	Data Type	Size	Constraints
Clientno	Varchar	4	Primary key
Name	Varchar	20	Not null
Address	Char	10	Unique
Joindate	Date		
Pincode	Number	9	
Bal_due	Number	7, 2	

- a) Write SQL for the followings queries. 8
  - i. Create **Client\_master** table.
  - ii. List the name of all the clients whose **Bal\_due** is greater than 10,000.
  - iii. Add the column "telephone no" to the **Client\_master** table.

- b) Using the above table write relational algebraic equation for the 7 following.
- Change the address of all clients of Kantipath to Kathmandu.
  - Delete all the records of the employee living in Pokhara.
4. a) What is difference between unique key and primary key? Explain 7 foreign key with example.
- b) When a view can be used in database? Explain the view update 8 operation in brief.
5. a) Why is normalization essential in relational database? Explain the 8 characteristics differences between JD and 5NF.
- b) List and explain the 3 major problems of concurrency. Describe how 7 you can address such problems.
6. a) What do you mean by functional dependency and MVD? Explain 8 non-loss decomposition with appropriate examples.
- b) What is transaction? Explain Atomicity and Consistency property of 7 transaction.

7. Write short notes on (*Any Two*)

2×5

- Client Server Architecture
- Statistical database
- Grouping and ungrouping
- Mandatory Access Control

**POKHARA UNIVERSITY**

Level: Bachelor

Semester – Fall

Year : 2009

Programme: BE

Full Marks: 100

Course: Database System

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Distinguish between logical and physical data independence. Describe the three level of data abstraction. 8
- b) What is derived attribute? Draw ER diagram for hospital management system. Include Weak entity, Composite attribute, derived attribute and multi-valued attribute in your ER diagram. 7
2. a) What is the importance of relational algebra? Distinguish between tuple relational calculus and domain relational calculus with appropriate examples. 7
- b) What is the relationship between Cartesian product operation and Natural join operation? Describe inner and outer join with examples. 8
3. a) Write the SQL statement to get the output from the student relation with attributes 10  
  
Student (*Roll no, SName, SAddress, SAge, Faculty, HostelName, BillAmount*)
  - i. List all IT-female students of Kathmandu and Pokhara.
  - ii. List all Students who have BillAmount due in descending order.
  - iii. Compute the total BillAmount Sexwise who read in semester IV and live in 'Naya Nepal' Hostel.
- b) How does the data dictionary manage by DBMS? Explain the Catalog with suitable example. 5
4. a) Define the process how the transactional data varies with state data. Discuss the different types of data encryption methods with suitable examples. 10  
    b) How does data view contrast with relation? Differentiate between dynast with snapshots. 5

5. a) Normalization is used to avoid the different types of anomalies which a database may suffer from. Clarify this concept with suitable example. 7
- b) What is a trivial and non-trivial functional dependency? Differentiate between BCNF and 3 NF. 8
6. a) Describe the two-phase commit protocol for multi-database transactions. 5
- b) What do you mean by failure? Define various types of failure with help of appropriate example. 5
- c) What is data encryption? Discuss the types of encryption techniques. 5
7. Write short notes on (Any Two) 2×5
- a) Client Server architecture
- b) Serialization
- c) Intent locking

## POKHARA UNIVERSITY

Level: Bachelor	Semester – Spring	Year : 2009
Programme: BE		Full Marks: 100
Course: Database System		Pass Marks: 45
		Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

- |  |     |
|--|-----|
| 1. a) Give arguments to show how DBMS is more suitable than file processing system. Also mention the disadvantages of DBMS | 8   |
| b) Describe three levels of data abstraction in DBMS. Also describe physical and logical data independence.                | 7   |
| 2. a) What are different aspects of Relational Databases? Define the 4 properties of Relations.                            | 3×5 |
| b) List the basic and advanced relational algebraic operators and explain Cartesian product and Tcolse with examples.      |     |
| c) Differentiate the role of grouping and ungrouping in relational database calculation.                                   |     |
| 3. a) Write SQL statements for the following queries.  | 10  |
- Employee(eid, ename, address, email)  
Works(eid, company\_name, salary)  
Company(company\_name, city)  
Manages(eid, manager\_id)
- |  |   |
|--|---|
| i) List all the employees whose email-id starts with ‘SA’.                   |   |
| ii) List the ename and email of all the managers.                            |   |
| iii) List the total salary of employees, group by company name.              |   |
| iv) Give 5% increment in salary of all the employees working in XYZ Company. |   |
| v) Add an attribute ‘no-of-employees’ in the table called ‘Company’.         |   |
| b) Explain different inner join operations. How are outer join different     | 5 |

from them? Explain.

4. a) What do you mean by data integrity? Discuss in detail about types of  $3 \times 5$  integrity. 7
- b) Illustrate the role of view in data security and performance with help of SQL facilities for view management.
- c) How does a logical design of database distinguish with physical design? Draw an ER diagram to design automated library. (consider all required attributes and entities)
5. a) What do you understand by transaction? Draw a state diagram and discuss the typical states that a transaction goes through during execution. 8
- b) Discuss the problem of deadlock and starvation? Describe wait-die and wound-wait protocol for deadlock prevention.
6. a) How does a trivial dependency contrast with non-trivial dependency? Find out the closure set from the following functional dependencies. 7
- i)  $A \rightarrow BC$
  - ii)  $B \rightarrow CD$
  - iii)  $C \rightarrow D$
  - iv)  $B \rightarrow D$
- b) Describe Bell-LaPadula model with reference to mandatory access control. 8
7. Write short notes on (Any Two): 2×5
- a) Data Dictionary
  - b) Public and private keys
  - c) Database users

4. a) Define database integrity. Classify the integrity constraints of database. 5
- b) Clarify the concept of view. How do they differ from relations. 5
- c) Highlight the main features of SQL. 5
5. a) What is normalization? Justify why are relational databases normalized. 5
- b) How does BCNF differ from 3NF? 5
- c) What are trivial and non-trivial dependencies? Find the closure set of attributes and functional dependency from the following: 5
- $A \rightarrow BC$ ,  $B \rightarrow C$ ,  $AB \rightarrow C$ ,  $AC \rightarrow D$ .
6. a) Enumerate the concept of two-phase commit protocol in multi-database transaction. 5
- b) What is deadlock? How do we remove such condition? 5
- c) Define concurrency? Why concurrency control is required? 5
7. Write short notes on (Any Two) 2×5
- a) Statistical database
- b) ER-diagram
- c) Data Encryption

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database System

Semester: Fall

Year : 2010  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

- |    |   |    |
|----|---|----|
| 1. | a) Define Database System. Discuss the characteristics of database approach and how it differs from traditional file system.  | 8  |
|    | b) Describe different types of data abstraction used in DBMS. Describe the terms physical and logical data independence.  | 7  |
| 2. | a) What is relational algebra? Compare and contrast relational algebra with the relational calculus.  | 7  |
|    | b) What is database transaction? Explain the ACID properties.   | 8  |
| 3. | a) Discuss the various outer join operations used in SQL.   | 5  |
|    | b) Given the relational database of a company that supplies different parts to different projects. Write Relational Algebra Expression or SQL Statement for each of the following requests. | 10 |

SUPPLIER (Sid, Sname, Status, City)

PARTS (Pid, Pname, Color, Weight, City)

PROJECT (Prj\_id, Prj\_name, City)

The primary keys are underlined.

- i. List the name of those parts that are found in the same city in which the supplier "Shyam" lives.
- ii. Find the average weight of all the parts the company deals with.
- iii. Modify the database so that the supplier "Ram" now lives in "Pokhara".
- iv. Create a view "PARTS\_CW" which displays color and weight of all the parts available.
- v. Drop the PROJECT table.

## POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database System

Semester – Spring

Year : 2010  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

***Attempt all the questions.***

1. a) Explain briefly the three level architecture of database. 5  
b) Define the database schema. Explain primary key, candidate key and foreign key. 5  
c) Differentiate between the weak entity set and strong entity set. 5
2. a) Consider the following schema and answer the following query in ~~simple~~ relational calculus:

Depositor (Customer-name, account-number)

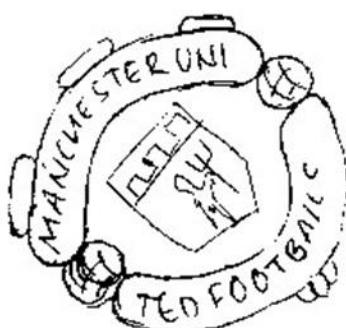
Borrower (Customer-name, loan-number)

Loan(loan-number, branch-name, amount)

  - i. Find loan number for loan of amount greater than \$1200.
  - ii. Find all customers name who have loan, an account or both at the bank.
  - iii. Fin all customers who have both account and loan at the bankb) Briefly explain the join operator with suitable examples. 7
3. a) Using the above Qn.No.2(a), write SQL statement for the following Task:
  - i. Find the loan number for loan of amount greater than Rs.1200.
  - ii. Find all customers name who have loan, an account or both at the bank.
  - iii. Find all customers who have both account and loan account at the bank.8

- b) What are the properties of a relation? Explain relation valued attribute along with an example. 7
4. a) What are the constraint classification schemes? Describe four major types of constraint which is applicable to maintain correctness in large database. 8
- b) Which ability of BCNF made it more enhanced than 3NF? Explain the 3NF and its limitations. 7
5. a) What is reducible and irreducible set of functional dependency? Find the equivalent closure set of functional dependencies for a Relation R with attributes A, B, C, D, E, F and FDs.  $AB \rightarrow C$ ,  $C \rightarrow A$ ,  $BC \rightarrow D$ ,  $ACD \rightarrow B$ ,  $BE \rightarrow C$ ,  $D \rightarrow EF$ . 8
- b) List the major problems of concurrency and discuss how compatibility matrix extends the locking granularity. 7
6. a) What is transaction recovery? Describe the system recovery in brief. 7
- b) Describe how the granting/revoking privileges helps to maintain security in Discretionary access control? Explain with the help of grant and revoke command in SQL. 8
7. Write short notes on any two: 2×5

- a) Two phase protocol
- b) Join Dependency
- c) Data Dictionary



# POKHARA UNIVERSITY

Level: Bachelor  
 Programme: BE  
 Course: Database Systems

Semester – Fall

Year : 2011  
 Full Marks: 100  
 Pass Marks: 45  
 Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) What do you mean by data dictionary? Show the role of data independence with the help of database architecture. 7
  - b) What are different aspects of Relational Databases? Define the four properties of relations. 8
  2. a) What are relational operators? Explain the additional algebraic operators with their application. 7
  - b) Consider the schema given below and write relational algebraic statements for the followings. 8
- Depositor = {customer\_name, account\_number}
- Borrower = { customer\_name, loan\_number }
- i. Find all tuples of loan for amount < 5000.
  - ii. Find all customers who have both loan and account.
  - iii. Add a field ‘address’ to the relation Depositor.
  - iv. Create a view to show only the customer name from the borrower relation.
  - v. Delete the field loan\_number from the relation Borrower.
3. a) Consider the following table 8

**Client\_master**

Column name	Data Type	Size	Constraints
Clientno	Varchar	4	Primary key
Name	Varchar	20	Not null
Nickname	Char	10	Unique

Joindate	Date		
Pincode	Number	9	
Bal_due	Number	7,2	Check $\geq$ 10000

Write SQL for the following queries:

- i. Create **Client\_master** table.
  - ii. List the name and nickname of all the clients whose Bal\_due is greater than 20,000 and whose name begin from 'R'.
  - iii. Add the columns "telephone\_no" and "fax\_no" to the **Client\_master** table.
  - iv. Change the size of column "Clientno" from 4 to 7.
  - b) What are views and snapshots? Write the importance of views. 7
4. a) Explain the various database constraints. 7
- b) What is reducible and irreducible set of functional dependency? Find the equivalent closure set of functional dependencies for a Relation R with attributes A, B, C, D, E, F and FDs  $AB \rightarrow C$ ,  $C \rightarrow A$ ,  $BC \rightarrow D$ ,  $ACD \rightarrow B$ ,  $BE \rightarrow C$ ,  $D \rightarrow EF$ . 8
5. a) Which ability of BCNF made it more enhanced than 3NF? Explain the 3 NF and its limitations. 7
- b) What are failures? Explain the various types of failures with the help of example. 8
- OR**
- What do you mean by system recovery? Define the role of checkpoint. 8
6. a) Enumerate the concept of two-phase commit protocol in multi-database transaction. 7
- b) Describe how the granting/revoking privileges helps to maintain security in Discretionary access control? Explain with the help of grant and revoke command in SQL. 8
7. Write short notes on **any two**: 2×5
- a) Multi value dependency
  - b) Relational calculus
  - c) Embedded SQL

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database Systems

Semester – Spring

Year : 2011  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

- |    |  |    |
|----|--|----|
| 1. | a. What is the importance of ER diagram in database systems?<br>Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Include appropriate composite attribute, derived attribute and multi valued attribute in your ER diagram.                      | 8  |
| 2. | b. Explain the relational calculus with example.   | 7  |
| 2. | a. What do you mean by Optimization?   | 5  |
|    | b. Consider the following base relvars (relations):<br><br>employee (emp_name, street, city)<br>works (emp_name, company, salary)<br>company (comp_name, city)<br>manages (emp_name, mngr_name)  | 10 |
|    | Give the SQL statements for each of the following:<br><br>i. Find employee names that lives in the city same as the company city<br>ii. List employee detail who earns more than Rs. 17,000<br>iii. Update address of Kiran to Sanepa, Lalitpur<br>iv. Create view for which employee earns Rs. 18,000 or more<br>v. Delete all employees for which manager name is null |    |
| 3. | a. Define NULL values. How NULL values is related with outer join?<br>b. What are the features of SQL? Give examples of embedded SQL.<br>c. What are integrity constraints? Write the differences between  | 5  |
|    |  | 5  |
|    |  | 5  |

- primary key and foreign key with example. 5
4. a. Why is normalization essential in RDBMS? What are lossy and non-loss decomposition? Explain with examples. 5
- b. What is BCNF? How does it solve the problem of functional dependency of candidate key? 5
- c. What are trivial and non-trivial dependencies? Find the closure set of attributes and functional dependency from the following: 5  
 $A \rightarrow BC, B \rightarrow C, AB \rightarrow C, AC \rightarrow D.$
5. a. Explain state and transitions constraints with example. 7
- b. What is transaction recovery? When the two transactions are said to be in deadlock state? Give example of such transactions. 8
6. a. What is dirty read? Describe two phase locking protocol. 7
- b. Explain with example how statistical database helps to maintain security? 8
7. Write short notes on **any two:** 2×5
- a. Serializability
- b. Grouping and ungrouping
- c. Dynast versus snapshots

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database Systems

Semester – Fall

Year : 2012  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Define Database System. Explain three level architecture of a database system 7
- b) What is difference between relational calculus and relational algebra? Write about any 3 types of relational algebraic operators. 8
2. a) Define NULL Values. Explain the additional algebraic operators with their application. 5
- b) What are the features of SQL? Differentiate between Pro SQL verses embedded SQL. 5
- c) What is a constraint? Explain foreign Key with example. 5
3. a) Consider the following base relvars (relations): 10  
  
        employee (emp\_name, street, city)  
        works (emp\_name, company, salary)  
        company (comp\_name, city)  
        manages (emp\_name, mngr\_name)

Give the SQL statements for each of the following:

- i. Find employee names for which manager name is null.
  - ii. List employee detail who works in “Newtech Pvt. Ltd.” company.
  - iii. Increase the salary by 10% who works in Kathmandu city.
  - iv. Create view for employee who earns Rs. 18,000 or more
  - v. Delete all employees that lives in the city same as the company city
- b) Discuss the roles of database administrator. 5
4. a) When a view can be used in database? Explain the view update 7

operation in brief.

- b) List all the functional dependencies that exist in table below. 8

Normalize the table in BCNF.(consider Books\_id is primary key)

<u>Books id</u>	Price	Publisher	Publisher_phone
Database	2000	McGraw	999912
Math	2100	McGraw	999912
software	1700	Willy	999922
Microprocessor	1700	O reilly	999977

5. a) Define trivial and non-trivial dependencies and compute closure set of attributes and functional dependency from following: 7  
 $A \rightarrow BC$ ,  $B \rightarrow C$ ,  $A \rightarrow B$ ,  $AB \rightarrow C$ ,  $AC \rightarrow D$ .

- b) What is system recovery? When the two transactions are said to be in deadlock state? How these deadlocks can be addressed. 8

6. a) What is transaction recovery? Describe the operation of two-phase commit protocol. 8  
b) What do you mean by data encryption? Define Symmetric and Asymmetric encryption with proper examples. 7

7. Write short notes on any two: 2×5

- a) Various data integrity
- b) Remote Backup
- c) Grouping and ungrouping

**POKHARA UNIVERSITY**

Level: Bachelor      Semester: Spring      Year : 2012  
 Programme: BE      Full Marks: 100  
 Course: Database Systems      Pass Marks: 45  
 Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define composite and component attribute. Draw ER diagram for following situation:  
 Consider an Air ticketing system that records information about the passenger, plane and route. Passenger is assigned to a plane and plane travels to route. A plane is assigned to many passengers and a passenger can be assigned into only one plane. Many planes travel to same route but a plane can travel in only one route. The attributes of passenger are pid (unique), gender and telephone (multivalued). Similarly plane contains rid(unique), distance and rate(based on distance) as attribute.  
 b) Explain Realtion Calculus versus relation algebra in terms of relationally complete and relational completeness with example.
2. a) Consider the following relation database where the primary keys are underlined.  
 $\text{Employee}(\underline{\text{employ-name}}, \text{street}, \text{city})$   
 $\text{Works}(\underline{\text{employ-name}}, \text{company-name}, \text{salary})$   
 $\text{Company}(\underline{\text{company-name}}, \text{city})$   
 $\text{Manages}(\underline{\text{employ-name}}, \text{manager-name})$

Give an expression in relation algebra to express each of the following queries:

- i. List all the name of employees who work for 'BOK Company'.
- ii. List the name of cities of residence of all employee who work for BOK Company.
- iii. Find the names, streets address, and cities of all the employee

who work for BOK Company and earn more than NRs 15000. Give an expression in SQL to express each of the following queries:

- |   |     |
|---|-----|
| <ol style="list-style-type: none"> <li>i. Modify the database so that 'Rajaram' now leaves in Kathmandu.</li> <li>ii. Add an attribute 'manager-id' in the table called 'managers'.</li> </ol>  | 5   |
| <ol style="list-style-type: none"> <li>b) Define embedded SQL. What are the features of SQL?</li> </ol>   | 7   |
| <ol style="list-style-type: none"> <li>3. a) Clarify the concept of view. How it differ from relations. Write SQL syntax, code to create the view.</li> </ol>   | 8   |
| <ol style="list-style-type: none"> <li>b) Give an example of a relation that is in third normal form, but that is not in Boyce-Codd normal form, and explain why it is in third, but not Boyce-Codd, normal form.</li> </ol>                                      | 8   |
| <ol style="list-style-type: none"> <li>4. a) Explain security versus integrity? Discuss in detail about types of integrity.</li> </ol>  | 8   |
| <ol style="list-style-type: none"> <li>b) Define functional dependency. Use basic inference rule for functional dependency to prove <math>AD \rightarrow F</math> if <math>A \rightarrow BC, B \rightarrow E</math> and <math>CD \rightarrow EF</math></li> </ol> | 7   |
| <ol style="list-style-type: none"> <li>5. a) What is concurrency control? Describe ACID property of transaction.</li> </ol>   | 8   |
| <ol style="list-style-type: none"> <li>b) Define recovery. When the two transactions are said to be in deadlock state? How these deadlocks can be addressed.</li> </ol>   | 7   |
| <ol style="list-style-type: none"> <li>6. a) Define encryption. Explain statistical database with suitable example.</li> </ol>  | 7   |
| <ol style="list-style-type: none"> <li>b) Describe Data Base System architecture. Also describe physical and logical data independence.</li> </ol>  | 8   |
| <ol style="list-style-type: none"> <li>8. 7. Write short notes on: (Any two)</li> </ol>   | 2x5 |
| <ol style="list-style-type: none"> <li>a) Semi minus and Tclose join</li> </ol>   |     |
| <ol style="list-style-type: none"> <li>b) Catalog</li> </ol>  |     |
| <ol style="list-style-type: none"> <li>c) Snapshot</li> </ol>   |     |

# POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database Systems

Semester: Fall

Year : 2013  
Full Marks: 100  
Pass Marks: 45  
Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) How we get information from data? Explain the statement "DBA has central control over the database system". 7  
b) Draw ER diagram for following situation:  
A company database needs to store information about employees (identified by *ssn*, with *salary* and *phone* as attributes), departments (identified by *dno*, with *dname* and *budget* as attributes), and children of employees (with *name* and *age* as attributes). Employees *work* in departments; each department is *managed* by an employee; a child must be identified uniquely by *name* when the parent (who is an employee; assume that only one parent works for the company) is known. 8
2. a) What is tuple relational calculus? What are the different types of rational operators used in RDBMS? Explain with example. 8  
b) Consider the relational database  
*Engineer(name,age,address)*  
*Works(name,deptno)*  
*Section(sectionno,floor,room)* 7  
Write relational algebra expression to perform the following:
  - i. Display floor of engineer named 'PETER'.
  - ii. Count the number of engineer working on 1<sup>st</sup> floor.
  - iii. Delete all the section of top floor.
  - iv. Insert the new section.
  - v. Increase the age of engineer named "BABU" by 1.
3. a) Consider the following base relvars (relations): 10  
*employee (emp\_name, street, city)*  
*works (emp\_name, company, salary)*

company (comp\_name, city)

manages (emp\_name, mngr\_name)

Give the SQL statements for each of the following:

- i. Find employee names that lives in the city same as the company city.
  - ii. List employee detail who earns more than Rs.17,000.
  - iii. Update address of Kiran to Sanepa, Lalitpur.
  - iv. Create view for which employee earns Rs. 18,000 or more.
  - v. Delete all employees for which manager name is null.
- b) How does catalog differ from data dictionary? Explain the Catalog and System Catalog. 5
4. a) What are integrity constraints? Write the differences between primary key and foreign key with example. 7
- b) Why is view considered as dynamic virtual relation? Explain view update in brief. 8
5. a) Define third normal form. Convert the following 2NF relation into 3NF(consider Name as primary key) 8

Name	Address	Phone	Salary	Post
Gill	KTM	456789	20000	Engineer
Van	BKT	654321	20000	Engineer
Robert	KTM	456789	20000	Engineer
Brown	BKT	654321	10000	Overseer
Albert	KTM	454545	10000	Officer

- b) Differentiate between FD and MVD? Explain closure set of functional dependencies with example. 7
6. a) What are the typical security classifications? Explain the Justification behind these rules for enforcing multilevel security. 8
- b) What do you mean by recovery? Discuss the different types of recovery. 7
7. Write short notes on: (Any two) 2×5
- a) Relation Calculus Vs Relational Algebra.
  - b) Intent locking.
  - c) Two phase commit protocol.

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Database Systems

Semester: Spring

Year : 2013

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) How we get information from data? Explain the statement "DBA has central control over the database system". 7
- b) Draw ER diagram for following situation:  
A company database needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dno, with dname and budget as attribute), and children if employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. 8
2. a) Consider following relations; 10  
 employee (emp\_name, street, city)  
 works (emp\_name, company, salary)  
 company (comp\_name, city)  
 manages (emp\_name, manager\_name)  
 Write SQL statements for,
  - Find employee names that lives in the city same as the company city.
  - List employee detail who earns more than 20,000.
  - Update address of an employee 'Sriyash' to 'Pokhara'.
  - Create a view for which employee earns Rs. 20,000 or more.
  - Delete all employees from the table employee
- b) What are relational operators? Explain the additional algebraic operators with their application. 5
3. a) Write about 1NF, 2NF, 3NF and BCNF. 8

1

4. a) What are views and snapshots? Write the importance of views. 7
- b) What are integrity constraints? Write the differences between primary key and foreign key with example. 7
5. a) Why is security needed and how can it be achieved? 8
- b) What is media recovery? Explain the properties of transactions. 7
6. a) Define encryption. Explain statistical database with suitable example. 8
- b) Differentiate between FD and MVD. Explain closure set of functional dependencies with example. 7
- b) "Concurrency is unavoidable evil for distributed transaction", do you agree? If yes, define the two phase commit protocol. 8
7. Write short notes on: (*Any two*) 2×5  
 a) Embedded SQL  
 b) Relational calculus  
 c) Stored Procedure  
 d) Tuple Calculus and Domain Calculus.

5. a) When does transaction failure occur? Describe other major types of failures. 7  
 b) What do you mean by relational variable? What are the properties of a relation? Illustrate. 8
6. a) How can we create view and why it is necessary? Explain the types of cryptography system. 7  
 b) Design a complete E-R diagram of your college internal examination department where two unit-test and one final test is conducted. 8
7. Write short notes on: (Any Two) 2×5  
 a) Shapshots  
 b) Mandatory Discretionary  
 c) Groping and ungrouping

### POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2014  
 Programme: BE Full Marks: 100  
 Course: Database Systems Pass Marks: 45  
 Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) What is the responsibility of DBA with respect to
  - i. Conceptual database design
  - ii. Data Integrity
  - iii. Database system performance
 b) How does the relational tuple calculus differ with domain calculus? Compare the computational efficiency of relational algebra with relational calculus. 15
2. Write SQL statements for following relations  
 Employee (EID, name, address, city, hiredate, salary, dept ID)  
 Customer (CID, name, address, city, category), Department (dept\_ID, location)  
 Sales (SID, description, Saleprice)  
 Purchase (PID, date, discount, CID, EID, SID)
  - i. List out all employees who were hired before 01-Jan-2010.
  - ii. Find out total no. of purchases made without discount.
  - iii. List out the customers who live in the city where employee lives
  - iv. To find the difference between highest and lowest salary.
  - v. Insert a set of data element to each table
3. a) How does database protect data from authorized users? Define types of constraints with the help of examples. 8  
 b) Define multivalued dependency and join dependency. State and explain 4NF with suitable example. 7
4. a) Define trivial and non-trivial dependencies and computer closure set of dependencies from following FDs. 8  
 b) Why concurrency control is needed? Explain the 2PL scheme. 7

POKHARA UNIVERSITY

Level: Bachelor  
Programme: BE  
Course: Database System

Semester: Spring

Year : 2014  
Full Marks : 100  
Pass Marks : 45  
Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Define Database system. What are the major applications of Database System? 10
- b) Why we need E-R diagram? Define super key, candidate key and primary key. 5
2. a) What do you mean by Relational Algebra? Explain the fundamental operations in Relational Algebra. 8
- b) Describe SQL view & Embedded SQL with example. 7
- a) Define the terms tuple, domain, degree and cardinality by the help of relation. 5
- b) Write the SQL statements for the following queries by the reference of student relation. 10

id	name	address	sgpa
1	Ram	kathmandu	3.3
2	Shyam	bhaktapur	2.7
3	Alex	lalitpur	3.7
4	Jane	hetauda	3.2
5	Stuart	birgunj	3.9

- i. Creates student schema.  
ii. Inserts one more record in student as above.  
iii. Lists all record who have sgpa >3.0.  
iv. Changes 'Alex' name as 'Bijaya'.  
v. Removes all record from database who lives in kathmandu.
- a) Differentiate between Functional & Trivial dependency. 5
- b) Define database integrity. Classify the integrity constraints of Database. 5
- c) Describe Referential Integrity. Explain the state and transition constraints. 5
- a) What do you mean by Recovery? Explain Transaction & System recovery. 7
- b) Explain 1NF, 2NF & 3NF in detail. 8
- a) Describe ACID properties of transaction. What are the different transaction states? 7
- b) What do you mean by concurrency? Explain two phase locking protocol in detail. 8
- Write short notes on: (Any two) 2×5
- a) Access control  
b) Client server architecture

**POKHARA UNIVERSITY**

Level: Bachelor      Semester: Fall      Year : 2016  
 Programme: BE      Full Marks: 100      Pass Marks: 45  
 Course: Database System      Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What are the significant differences between a file-processing system and a DBMS? List the major steps that you would take in setting up a database for a particular enterprise. 7

- b) Design an E-R diagram for keeping track of the exploits of your favourite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes. 8

2. a) 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 keys. For each of the following relational algebra expressions, state in terms of  $r$  and  $s$  the minimum and maximum number of tuples that could be in the result of the expression. 7

- a.  $R \cup \rho_{S(A,B)} S$
- b.  $\pi_{A,C}(R \bowtie S)$
- c.  $\pi_B R - (\pi_B R - \pi_B S)$
- d.  $(R \bowtie R) \bowtie R$
- e.  $\sigma_{A>B} R \cup \sigma_{A<B} R$

- b) Consider the relational database of Figure below, where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries: 8

employee (person-name, street, city)  
 works (person-name, company-name, salary)  
 company (company-name, city)  
 manages (person-name, manager-name)

- i. Find the company with the least employees.
- ii. Find the company with the highest payroll.
- iii. Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.
- iv. Delete all tuples in works relation for employee of Nepal Airlines.

3. a) Consider the employee database of figure given below, where primary keys are underlined. Give an expression in SQL for each of following queries. 10

employee (person-name, street, city)  
 works (person-name, company-name, salary)  
 company (company-name, city)  
 manages (person-name, manager-name)

- i. Find the names of all employees who work for First Bank Corporation.
- ii. Find the names of all employees who work for First Bank Corporation and Salary less than \$10,000.
- iii. Add a new employee to the database; assume any values for required attributes.
- iv. Find the names and cities of residence of all employees who work for Nepal Bank.
- v. Increase the salary of all employee who work for First Bank Corporation by 25 percent.

- b) Describe the circumstances in which you would choose to use embedded SQL rather than SQL alone or only a general-purpose programming language. 5

4. a) What do you mean by Drooping Constraints? Explain its types. 8

- b) What are views and snapshots? Write the importance of views. 7

5. a) What is Normalization and why it is done? Demonstrate the normalization from 1NF to BCNF taking own relevant examples. 8

- b) State and explain with example about functional dependency and multivalued dependency. 7

6. a) What do you mean schedule and serializability? What are view serialization schedules? 8

- b) What do you mean by concurrency control? Describe Two phase Commit Protocol. 7

7. Write short notes on: (Any two) 2×5

- a) Cryptography
- b) Relational Calculus
- c) BCNF

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Database System

Semester – Fall

Year : 2017

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Explain briefly the three level architecture of database. 5

- b) Define the database schema. Explain primary key, candidate key and foreign key.

- c) Differentiate between the weak entity set and strong entity set. 5

2. a) Consider the following schema and answer the following query relational calculus: 8

Depositor (Customer-name, account-number)

Borrower (Customer-name, loan-number)

Loan(loan-number, branch-name, amount)

i. Find loan number for loan of amount greater than \$1200.

ii. Find all customers name who have loan, an account or both at the bank.

iii. Fin all customers who have both account and loan at the bank

- b) Briefly explain the join operator with suitable examples. 7

3. a) Using the above Qn.No.2(a), write SQL statement for the following 8

Task:

i. Find the loan number for loan of amount greater than Rs.1200.

ii. Find all customers name who have loan, an account or both at the bank.

iii. Find all customers who have both account and loan account at the bank.

- b) What are the properties of a relation? Explain relation valued attribute along with an example. 7

4. a) What are the constraint classification schemes? Describe four major types of constraint which is applicable to maintain correctness in large database.

- b) Which ability of BCNF made it more enhanced than 3NF? Explain the 3NF and its limitations. 7

5. a) What is reducible and irreducible set of functional dependency? Find the equivalent closure set of functional dependencies for a Relation R with attributes A, B, C, D, E, F and FDs.  $AB \rightarrow C$ ,  $C \rightarrow A$ ,  $BC \rightarrow D$ ,  $ACD \rightarrow B$ ,  $BE \rightarrow C$ ,  $D \rightarrow EF$ . 8

- b) List the major problems of concurrency and discuss how compatibility matrix extends the locking granularity. 7

6. a) What is transaction recovery? Describe the system recovery in brief. 7
- b) Describe how the granting/revoking privileges helps to maintain security in Discretionary access control? Explain with the help of grant and revoke command in SQL. 8

7. Write short notes on **any two:** 2×5

a) Two phase protocol

b) Join Dependency

c) Data Dictionary

## POKHARA UNIVERSITY

Level: Bachelor  
 Programme: BE  
 Course: Database Management System

Semester: Spring  
 Year : 2014  
 Full Marks: 100  
 Pass Marks: 45  
 Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) What are the major responsibilities of Database Management System? For each responsibility, explain the problems that would arise if the responsibility were not discharged
- b) Compare Hierarchical Model, Network Model and Relational Model base on operation performed.

2. a) Consider the relational database of Figure below, Where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:

Employee (person-name, street, city)

Works (person-name, bank-name, salary)

Bank (bank-name, city)

Manages (person-name, manager-name)

- i. Find the total salary sum of all the banks.
- ii. Modify the database so that Ram now lives in Kathmandu.
- iii. Fine the name, street address, and cities of residence of all employees who work for Nepal World Bank Corporation and earn more than \$10,000 per annum.
- iv. Delete all tuples in works relation for employee of Small Bank Corporation

- b) State and explain B+ tree index. Show an example of Insertion on B+ trees.

3. a) Consider the employee database of figure given below, where primary keys are underlined. Give an expression in SQL for each of following queries.

Employee (employee-name, street, city)

- Works (employee-name, company-name, salary)  
 company (company-name, city)  
 manages (employee-name, manager-name)
- i. Modify the database so that Ram now lives in Kathmandu.
  - ii. Give all employees of First Bank Corporation a 10 percent raise.
  - iii. Give all managers of First Bank Corporation a 10 percent raise.
  - iv. Delete all tuples in the works relation for employees of small Bank Corporation.
  - v. Find all employees who earn more than the average salary of all employees of their company.
- 7      4. a) Explain the need of stored procedures & its application. 5
- a) What is referential integrity? Explain the functional dependency and multivalued dependency with suitable example.
  - b) What is Normalization and why it is done? Give an example of a relation schema R and a set of dependencies such that R is not in 3NF and normalize it into 3NF. 8
- 8      5. a) What are the needs of cryptography? How security can be granted using view? Explain? 7
- b) Show how to derive the following equivalences by a sequence of transformations using the equivalence rules. 8
- i.  $\sigma \theta_1 \wedge \theta_2 \wedge \theta_3 (E) = \sigma \theta_1 (\sigma \theta_2 (\sigma \theta_3 (E)))$
  - ii.  $\sigma \theta_1 \wedge \theta_2 \bowtie \theta_3 (E_2) = \sigma \bowtie (E_1 \theta_3 (\sigma \theta_2 (E_2))),$  where  $\theta_2$  involves only attributes from  $E_2$
6. a) What do you mean by shadow paging? Explain Deferred Database modification with an illustration. 7
- b) Explain the concept of locking for concurrency control. 8
7. Write short notes on: (Any two) 2
- a) ORM
  - b) 2PL
  - c) Hash Index

## POKHARA UNIVERSITY

Level: Bachelor Semester: Fall

Programme: BE

Course: Database Management System

Year : 2015

Full Marks: 100

Pass Marks: 45

Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Compare & Contrast between file system & Database system. Difference between Schema & Instances. 7
- b) Define data model. Explain the different types of data model. 8
2. a) Consider the relational database of Figure below, where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:  
employee (person-name, street, city)  
works (person-name, bank-name, salary)  
bank (bank-name, city)  
manages (person-name, manager-name)
  - i. Find the names of all employees who work for Nepal Rastra Bank and Salary greater than \$10,000.
  - ii. Find the names and cities of residence of all employees who work for Nepal Rastra Bank.
  - iii. Find the names, street address, and cities of residence of all employees who work for Nepal Rastra Bank Corporation and earn more than \$10,000 per annum.
  - iv. Delete all tuples in works relation for employee of Nepal Rastra Bank.
- b) Write SQL statements for the following queries in reference to relation **Emp\_time** provided. 7

Eid*	Name	Start_time	End_time
E101	Hari	10:15	18:00
E102	Malati	8:00	15:30
E103	Kalyan	9:30	17:00

- i. Create the table **Eid\*** as primary key and insert the values provided.
- ii. Display the name of the employee whose name start from letter 'M' and who work for more than seven hours.
- iii. Delete the entire contents of the table so that new data can be inserted.
3. a) What do you mean by Normalization? Explain the BCNF and 5th normal form with examples 8
- b) Differentiate between authentication & authorization. How encryption & decryption occurs in Private key & Public key cryptography? 7
4. a) What are the basic steps in Query Optimization? Explain with suitable diagram. 8
- b) List out the major advantages of B+ tree index. Explain the concept of Hashing. 7
5. a) Compare the shadow paging recovery scheme with the log based recovery scheme. 8
- b) What do you mean by a schedule? When schedule is called serializable? What are conflict serialization schedules? 7
6. a) Explain the roles of Assertions and Triggers in SQL. When Triggers are not appropriate to use? Give an example 8
- b) Explain the distinction among the terms primary key, candidate key, super key and foreign key with an example. 7
7. Write short notes on: **(Any two)** 2×5
  - a) Applications of Database
  - b) Functional Dependency
  - c) Distributed Database

## POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2015

Programme: BE

Full Marks: 100

Course: Database Management System

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

***Attempt all the questions.***

1. a) Explain the importance of DBMS in current world. How is it accessed using various DDL, DML and DCL languages? 8
- b) Suppose you are given the following requirements for a simple database for the National Cricket League (NCL):
  - the NCL has many teams
  - each team has a name, a city, a coach, a captain, and a set of players
  - each player belongs to only one team
  - each player has a name, a type (such as batsman or bowler), a skill level, and a set of records
  - a team captain is also a player
  - each player is sponsored by at least one brand
  - a brand has its name, established date, property, multiple contact\_no.

Construct a clean and concise ER diagram for the NCL database. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.\*

2. a) Consider the relational database of Figure below, where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:  
employee (person-name, street, city)  
works (person-name, bank-name, salary)  
bank (bank-name, city)  
manages (person-name, manager-name)
  - i. Find the names of all employees in this database who live in

- the same city as the company for which they work.
- ii. Give all employees of First Bank Corporation a 10 percent salary raise.
- iii. Modify the database so that Harish now lives in Biratnagar.
- iv. Delete all tuples in works relation for employee of First Bank Corporation.
- b) Construct a B+-tree for the following set of key values: (2, 3, 5, 7, 11, 17, 19, 23, 29, 31) Assume that the tree is initially empty and values are added in ascending order. Construct B+-trees for the case where the number of pointers that will fit in one node is **Four**. Also show the form of the tree after deletion of 23.
3. a) Suppose we are given the following table definitions with certain records in each table. (Underline attribute represent primary key attributes.).
- EMPLOYEE (EID, NAME, POST, AGE)
  - POST (POST-TITLE, SALARY)
  - PROJECT (PID, PNAME, DURATION, BUDGET)
  - WORK-IN (PID, EID, JOIN-DATE)
- Write the SQL statement for
- i. List the name of employees whose age is greater than the average age of all employees.
  - ii. Display all employee numbers of those employee who are not working in any project
  - iii. List name of employee and their salary who are working in the project "DBMS".
  - iv. Update the database so that "Rishab" now lives in "Butwal".
- b) What is joining in DBMS? Explain different types of join with example.
4. a) What do you mean integrity constraints? Explain assertion and triggers in SQL with their syntax.
- b) Define functional dependency. Consider a table which is in 2NF but not in 3NF. Break the table so that it is now in 3NF with a table example.
5. a) What is cryptography? Explain encryption and decryption technique.
- b) What is query processing? Explain the step used in query processing.
- |  |    |   |     |
|--|----|---|-----|
|  |    | 6. a) In a log based recovery, how does deferred modification scheme differ with immediate modification scheme? | 7   |
|  |    | b) What is concurrency control? Describe ACID property of transaction.  | 8   |
|  | 7. | Write short notes on: ( <b>Any two</b> )  | 2×5 |
|  |    | a) Data warehouse   |     |
|  |    | b) Schema and Views   |     |
|  |    | c) Data abstraction.  |     |

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Database Management System

Semester: Fall

Year : 2016

Full Marks: 100

Pass Marks: 45

Time : 3 hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

1. a) Define RDBMS. Explain the differences between file oriented system and a database oriented system. 7
- b) Construct E-R model for a car insurance company whose customer own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Also Design a relational database corresponding to the E-R diagram. 8
2. a) Consider a student registration database comprising of the below given schema. 6

Student(CRN, Name, Gender, Address, Telephone)  
 Course(CourseID, CourseName, Hour, TeacherID)  
 Teacher(TeacherID, TeacherName, Office)  
 Registration(CRN, CourseID, Date)

Write relational algebraic expression for the following tasks:

- i. Count the number of student registered subject in year 2015 gender wise.
  - ii. Show student details taught by teacher Rohit Shrestha.
  - iii. Delete student information taught by teacher N. Mathema.
- b) Consider a relational Schema: 9

Teacher(TeacherID, TeacherName, Office)

Write SQL statement for the following task:

- i. To create a table from a table.
- ii. To eliminate duplicate rows.
- iii. To add a new column 'Gender' in the table.
- iv. To sort data in a table.
- v. To delete rows.

- vi. Count number of rows based on Office. 9
  3. a) State the need for Normalization of a database and explain the 1NF, 2NF and 3NF with suitable example. 6
  - b) What is functional dependency? Explain its types in detail. 7
  4. a) Explain sequential file organization. What are hash functions, explain giving example. 8
  - b) Discuss about the Access control mechanisms and cryptography methods to secure the database. 8
  5. a) Write a detail description about Query Processing and Optimization. Explain the cost estimation of Query Optimization. 8
  - b) Difference between object oriented model distributed database. 7
  6. a) Compare the Shadow paging recovery scheme with the log based recovery schema. 7
  - b) Explain the conflict and view serializability with suitable example. Discuss the testing of serializability also. 8
  7. Write short notes on: (Any two) 2×5
- a) DDL and DML SQL statement
  - b) ACID Properties
  - c) Stored procedure.

# POKHARA UNIVERSITY

Level: Bachelor                      Semester: Spring  
 Programme: BE  
 Course: Database Management System

Year : 2016  
 Full Marks: 100  
 Pass Marks: 45  
 Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

*Attempt all the questions.*

- |  |  |   |
|--|--|---|
| 1. a)  | Explain the need of DBMS over file system. Explain the various level of data abstraction with examples.  | 7 |
| b)   | Construct an ER diagram for a banking enterprise that keeps the information about employee, customer, loan, account and payment.   | 8 |
| 2. a)  | How does a view differ with relation? Define the role of view in security.   | 7 |
| b)   | Consider the following schema of a relational database.<br><br><b>Branch</b> (branch-name, branch-city, assets)<br><b>Account</b> (account-number, branch-name, balance)<br><b>Customer</b> (customer-id, customer-name, customer-street, customer-city)<br><b>Depositor</b> (customer-id, account-name)<br><b>Loan</b> (loan-number, branch-name, amount)<br><b>Borrow</b> (customer-id, loan-number) | 8 |
| Write the relational algebra for the following queries:<br>i. Find all customer either account or loan<br>ii. List the name and city of customer who have their account at the branch location 'Butwal'.<br>iii. Delete all account in the branch "B1"<br>iv. Increase balance by 5% to all branches |  |   |
| 3. a)  | Define stored procedure. List the advantages and disadvantages of stored procedure. Explain how stored procedure are created with example.   | 7 |
| b)   | Consider a simple relational database of Hospital Management System. ( <u>Underlined attributes represent Primary key attributes</u> )<br><br><b>Doctors</b> (DoctorID, DoctorName, Department, Address, Salary)   | 8 |

Patients (PatientID, Patient Name, Address, Age, Gender)  
 Hospitals (PatientID, Doctor ID, HostpitalName, Location)

Write Down the SQL statement for the following.

- |       |   |              |
|-------|---|--------------|
| i.    | Display ID of Patient admitted to hospital at Pokhara and whose name ends with 'a'.   |              |
| ii.   | Delete the record of Doctors whose salary is greater than average salary of doctors.  |              |
| iii.  | Increase the salary of doctors by 18.5% who works in OPD department.  |              |
| iv.   | Find the average salary of Doctors for each address who have average salary more than 55K.  |              |
| 4. a) | What do you mean integrity constraints? Explain assertion and triggers in SQL with their syntax.  | 7            |
| b)    | Define functional dependency. Explain BCNF and 3NF with suitable examples.  | 8            |
| 5. a) | Construct a B+ tree for the following set of key values:<br>$\{2, 3, 5, 11, 17, 19, 23, 29, 31\}$<br>Assume that the tree is initially empty and values are added in ascending order. | 8            |
| b)    | What do you mean by query processing? Explain the query optimization process.   | 7            |
| 6. a) | What is log? Discuss the salient features of deferred database modification and immediate database modification strategies.   | 7            |
| b)    | Differentiate between exclusive lock and shared lock. Discuss the conflict and view serializability with suitable example.  | 8            |
| 7.    | Write short notes on: (Any two)   | $2 \times 5$ |
| a)    | Remote backup system  |              |
| b)    | Distributed database  |              |
| c)    | Cryptography  |              |

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Database Management System

Semester: Fall

Year : 2017

Full Marks: 100

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Describe about Schemas and Instances Write briefly about DDL and DML. 7
- b) Draw an ER diagram for the following scenario.  
A university contains many faculties. The faculties in turn are divided into several colleges. Each college offers numerous programs and each program contains many courses. Teachers can teach many different courses and even the same course numerous times. Courses can also be taught by many teachers. A student is enrolled in only one program but a program can contain many students. Students can be enrolled in many courses at the same time and the courses have many students enrolled. 8
2. a) Consider the following schema:  
  
employee (person\_name, street, city)  
works (person\_name, company\_name, salary)  
company (company\_name, city)  
manages (person\_name, manager\_name)  
Give an expression in relational algebra to express each of the following queries:
  - a) Find the names of all employees who earn more than their managers
  - b) Find the names of all employees who live in the same city and on the same street as their managers
  - c) Find the names of all employees within the database that do not work for "NBL company"
  - d) Find the names of all employees in the database who earn8

more than the top earner at "NBL Company" in the database.

- b) Write the SQL statements for the following queries by reference of **Liquors\_Info** relation:

Serial No	Liquors	Start year	Bottles	Ready year
1	Gorkha	1997	10	1998
2	Divine Wine	1998	5	2000
3	Old Durbar	1997	12	2001
4	Khukuri Rum	1991	10	1992
5	Xing	1994	5	1995

- i. Create the Liquors\_Info relation.
- ii. Insert the records in Liquors\_Info as above.
- iii. List all the records which were ready by 2000.
- iv. Remove all records from data base that required more than 2 years to get ready.
3. a) How does "GROUP BY" clause work? What is the difference between WHERE and HAVING clause? Explain each with examples 8
- b) What is a database anomaly? Explain different types of database anomalies with suitable examples. 7
4. a) What do you mean by normalization process? Why is it necessary in RDBMS? Justify. 7
- b) Differentiate between authorization and authentication with brief examples. 8
5. a) Why ACL technique is considered safe-way for database security? How is any user allowed or prevented from accessing a certain resource? Justify technically. 7
- b) What is Query optimization? How can it be achieved? 8
6. a) Explain how records of a file are placed and organized into a secondary storage. 8
- b) What is Remote backup system? How does it help any organization? Clarify. 7
7. Write short notes on: (Any two) 2x5
  - a) ACID Properties of transaction
  - b) Concurrency control
  - c) Distributed Databases

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2017

Programme: BE

Full Marks: 100

Course: Database Management System

Pass Marks: 45

Time : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Define database management system (DBMS). Mention the advantages of DBMS. Explain data independence with its importance. 7  
b) What do you mean by data model? What are the basic data modelling components? Briefly explain different types of data models. 8
2. a) Define relation schema and views. Consider the following relations for a database that keeps track of student enrollment in courses and the books adopted for each course: 8  

STUDENT(SSN, Name, Major, Bdate)  
COURSE(Course#, Cname, Dept)  
ENROLL(SSN, Course#, Quarter, Grade)  
BOOK\_ADOPTION(Course#, Quarter, Book\_ISBN)  
TEXT(Book ISBN, Book\_Title, Publisher, Author)

Draw a relational schema diagram specifying the foreign keys for this schema.

  
b) Explain several parts of Structured Query Language (SQL). What are the basic domain types? Describe them. 7
3. a) Describe the basic structure of SQL queries. Considering at least two relations, write SQL for illustrating different types of set operations. 7  
b) Design relational database for the Dept. of Computer Engineering (DoCE) at Pokhara University. Your database should have at least three (3) relations. Describe referential integrity constraint based on the above database of DoCE. 8
4. a) Define normalization in database. Mention its significances. With example, explain requirements to satisfy 1NF, 2NF, and 3NF. 8  
b) Briefly explain encryption techniques to secure application data. 7
5. a) With diagram, briefly explain the basic steps of query processing. 7  
b) Define indexing in database. With example, describe the structure of a B<sup>+</sup> -tree. 8
6. a) Explain the architecture of remote backup system. Discuss several issues that must be addressed while designing it. 8  
b) Define transaction and explain its ACID properties. Describe the two-phase locking protocol for concurrency control. 7
7. Write short notes on: **(Any two)** 2×5
  - a) Data Dictionary
  - b) QBE
  - c) Functional Dependencies

# POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Database Management System

Semester: Spring

Year : 2018

Full Marks: 100

Pass Marks: 45

Time : : 3hrs.

*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

**Attempt all the questions.**

1. a) Considering an example, differentiate between data and information. Explain, how DBMS overcome the limitations of traditional file processing system. 7

- b) Construct an *ER diagram* for a Metropolitan Bus Park. There are many gates for entering bus park. Different gates are assigned to different routes. A route uses different buses. Bus consists of different seats which are assigned to different passengers. Frequent travelers are also in passenger. Associate a log of reservation date while reserving seats. The passenger name must have two attributes *first\_name* & *last\_name*. Each of the entities must have primary key attribute as far as possible. The cardinality mappings should be explained properly. 8

2. a) Consider the relational database model: 7

Users (uid, cname, city)

Items (itemid, itemname, city, quantity, price)

Manager (mid, aname, city)

Query (queryno, uid, mid, itemid, query\_details, hitratio)

Write the relational algebraic expression for the following tasks:

- Find all (queryno, uid) pairs for query with a hitratio value greater than 500.
- Find all item names of items in Pokhara ordered with query\_deatis as pokhara\_details.
- Find itemids of items ordered through manager 35 but not through manager 27.

- b) Write SQL statements for following: 8

- Create a table named Vehicle with veh\_number as primary key and following attributes:  
veh\_type, veh\_brand, veh\_year, veh\_mileage, veh\_owner,

veh\_photo, veh\_price

- Enter a full detailed information of a vehicle.
- Increment vehicle's price by 10,000.
- Remove all vehicle's records whose brand contains character 'o' in second position.
- Display the total price of all vehicles.
- Create a view from above table.
- Display details of vehicles ordering on descending manner in brand and by mileage when brand matches.
- Change data type of year to datetime.

3. a) How does normalization help in organizing records in database? Justify with examples. 8

- b) Write down the properties of decomposition. Compare & contrast assertion & triggers. 7

4. a) Differentiate between authorization and authentication. Explain about access control and view. 7

- b) What is query optimization? List some strategies for optimization of queries and explain steps in for query processing with necessary diagram. 8

5. a) What is file organization? Explain how you organize files using B+ tree and hash index. 8

- b) What do you mean by crash recovery? Differentiate between deferred database modification and immediate database modification. 7

6. a) Define transaction & schedule. Explain different states in a transaction. 7

- b) Explain about distributed databases with its advantages and disadvantages. 8

7. Write short notes on: (Any two) 2×5

- a) Sequential File Organization

- b) Cascading in referential integrity

- c) Data warehouse & Data mining

**POKHARA UNIVERSITY**

Level: Bachelor  
Programme: BE  
Course: Database Management System

Semester: Fall  
Year : 2019  
Full Marks: 100  
Pass Marks: 45  
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

**Attempt all the questions.**

- |   |   |
|---|---|
| <p>1. a) What do you understand by Data Independence? How is Schema different from Instance? Justify with some suitable examples.</p> <p>b) How does UML diagram assist during data modeling? Draw an E-R diagram for a Gandaki Auto Vehicle Shop System including primary key, weak entity, composite attribute, derived attribute and multivalued attributes in your ER diagram</p>   | 7 |
| <p>2. a) How Relational Algebra is different from Relational Calculus? Define TRC and DRC.</p> <p>b) Consider a simple relational database of Hospital Management System. (<i>Underlined attributes represent Primary key attributes</i>)</p> <p>Doctors (<u>DoctorID</u>, DoctorName, Department, Address, Salary)<br/>Patients (PatientID, Patient Name, Address, Age, Gender)<br/>Hospitals (<u>PatientID</u>, <u>Doctor ID</u>, HospitalName, Location)</p> <p>Write down the SQL statement for the following:</p> <ol style="list-style-type: none"> <li>Display ID of Patient admitted to hospital at Pokhara and whose name ends with 's'.</li> <li>Delete the record of Doctors whose salary is greater than average salary of doctors.</li> <li>Increase the salary of doctors by 18.5% who works in OPD department.</li> <li>Find the average salary of Doctors for each address who have average salary more than 55K.</li> </ol> <p>Define Normalization. Explain about 1NF, 2NF &amp; 3NF.</p> <p>b) What do you mean by decomposition of relational schema? Suppose we are given Schema R = {A,B,C,G,H,I} and set of functional</p> | 8 |
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| <p>4. a) What is Access control mechanism in database? Explain different types of access control mechanism.</p> <p>b) Diagrammatically illustrate and discuss the steps involved in processing a query.</p>  | 8   |
| <p>5. a) Construct a B+ tree for the following set of key values: (2,3,5,7,11,17,19,23,29,31) Assume that the tree is initially empty and values are added in ascending order where the pointer number is Four</p> <p>b) What is Crash Recovery? What are the problems due to crash? How the problems can be avoided, explain any one briefly.</p> | 7   |
| <p>6. a) When does deadlock occurs? Explain two-phase commit protocol with example.</p> <p>b) What are data fragmentations? State the various fragmentations with examples.</p>  | 8   |
| <p>7. Write short notes on: (Any two)</p> <ol style="list-style-type: none"> <li>ACID property</li> <li>QBE</li> <li>Object Relational Model</li> </ol>  | 2×5 |

dependencies F={A→B, A→C, CG→H, B→H, CG→I}. Find the closures of functional dependency F.