B.E. (Computer)/Fourth Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

BEG276CO: Database Management System *(New Course)*

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

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer EIGHT questions.   **8×10=80**

1.   Define DBMS. Briefly explain the DBMS languages used for various operations.   1+4

(b)   What are the different types of database users? Discuss the main responsibilities of DBA.   2+3

2(a)   Differentiate between Network Data Model and Hierarchical Data Models.   5

(b)   Construct ER diagram for the following database schema.   5

EMPLOYEES(E-ID, E_Name, E_Address, E_Contact, E_Age, Salary)

DEPARTMENT(D_ID, D_Name, D_Location)

PROJECT(P_ID, P_Name, P_Manager, P_Duration)

WORK(E_ID, P_ID, D_ID, WorkingHour)

3(a)   Define relational algebra. Also list out the fundamental operators of relational algebra.   1+3

(b)   Consider the following relational schema

SUPPLIER(S_ID, S_Name, Address)

PARTS(P_ID, P_Name, Color, Quantity)

CATALOG(S_ID, P_ID, Cost)

Write a relational algebraic query for followings:

(i)   Find the names of suppliers who supply some red part.

(ii)   Find the name of all parts that are supplied in quantity greater than 300.

(iii)   Find the name of all parts supplied by "ABC Company".

4.   Consider the following relational schema.   10

SAILOR(S_ID, S_Name, Rating, Age)

RESERVES(S_ID,B_Id, Day)

BOAT(B_ID, B_Name, Color)

Write a SQL query to:

(i) Create above mentioned tables.

(ii) Insert one record in each of the relations.

(iii) Display the name of sailors who have reserved red boat.

(iv) Display the record of sailor reservation who have reserved green boat for 10 days.

(v) Delete the sailor's records who had reserved the boar for one month

5(a) What is the need of Normalization? Differentiate between 3NF and BCNF with suitable example.   2+3

(b) Compute the closure set of attributes for {A} and {BC} for the following relation: 5

R = {A, B, C, D}

FD's = {A-> B, C->D, C->E}

Also compute minimal super key for this relation.

6(a) What do you mean by database security? What is the importance of security in database system?   1+4

(b) Explain the principles of database security.   5

(b) What is a query-tree? Explain the concept of query optimization and query decomposition.   1+3

7(a) Explain the Query processing technique with a neat diagram.   5

(b) Differentiate between Sequential and hashed file organization.   5

8(a) What is a database transaction? Explain the concept of serializability of schedules with example.   1+4

(b) Discuss the deferred update and immediate update techniques of database recovery.   5

9. Write short note on any TWO: 5+5

(a) Distributed Database System

(b) Shadow Paging Recovery

(c) Triggers and views

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Answer EIGHT questions.　　　　　　　　　　　　8×10=80
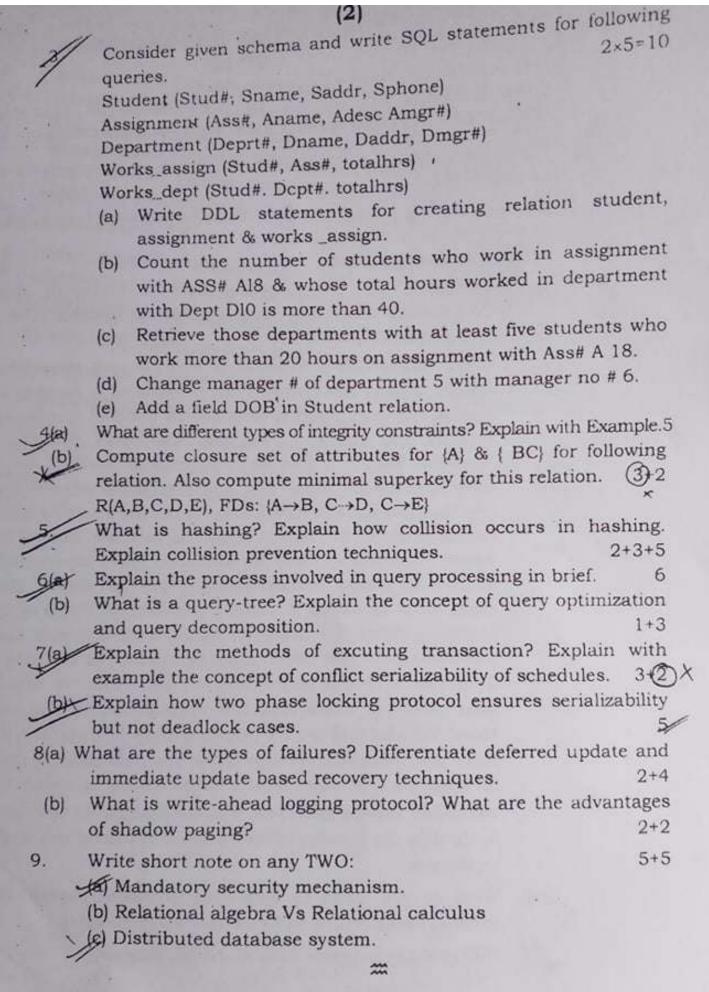
1. Construct an ER diagram for the Gorkhali Automobile Corporation which operates number of vehicles. The relevant information is given below.　　　　　　　　　　　　10

   Every vehicle has a registration number and each vehicle is of specific model. The company accommodates a number of vehicle models and each model is identified by a model number and has a capacity and weight. In addition, the model also has a range associated with it. A number of technicians work for the company. They have unique name, SIN. address, phone number and salary. The company has controllers who control the incoming and outgoing vehicle traffic in the vehicle areas. As they are exposed to a lot of smoke emissions and also because their job is important they need to have an annual medical examination. The date of most recent exam must be stored for each controller. All company employees including technicians belong to union. Each employee has a union membership number which must be stored. The company performs a number of checks periodically to ensure that the vehicles are in good condition. These tests are standardized by the Beaureau of Motor Vehicles and are identified by BMV test number. Test has a name and maximum possible score. The BMV requires the company to keep track of each time a given vehicle is tested by a given technician using a given test. The information for each testing event is the date the number of hours spent in testing and score received on the test.

2(a) What do you mean by data independence? Explain how three-schema architecture ensures data independence?　　　　　2+5

(b) Differentiate between DDL and DML language.　　　　　　3

3 Consider given schema and write SQL statements for following queries. 2×5=10

Student (Stud#, Sname, Saddr, Sphone)
Assignment (Ass#, Aname, Adesc Amgr#)
Department (Deprt#, Dname, Daddr, Dmgr#)
Works_assign (Stud#, Ass#, totalhrs)
Works_dept (Stud#. Dcpt#. totalhrs)

(a) Write DDL statements for creating relation student, assignment & works _assign.

(b) Count the number of students who work in assignment with ASS# A18 & whose total hours worked in department with Dept D10 is more than 40.

(c) Retrieve those departments with at least five students who work more than 20 hours on assignment with Ass# A 18.

(d) Change manager # of department 5 with manager no # 6.

(e) Add a field DOB' in Student relation.

4(a) What are different types of integrity constraints? Explain with Example. 5

(b) Compute closure set of attributes for {A} & { BC} for following relation. Also compute minimal superkey for this relation. ③ 2

R(A,B,C,D,E), FDs: {A→B, C→D, C→E}

5. What is hashing? Explain how collision occurs in hashing. Explain collision prevention techniques. 2+3+5

6(a) Explain the process involved in query processing in brief. 6

(b) What is a query-tree? Explain the concept of query optimization and query decomposition. 1+3

7(a) Explain the methods of excuting transaction? Explain with example the concept of conflict serializability of schedules. 3 ② X

(b) Explain how two phase locking protocol ensures serializability but not deadlock cases. 5

8(a) What are the types of failures? Differentiate deferred update and immediate update based recovery techniques. 2+4

(b) What is write-ahead logging protocol? What are the advantages of shadow paging? 2+2

9. Write short note on any TWO: 5+5

(a) Mandatory security mechanism.

(b) Relational algebra Vs Relational calculus

(c) Distributed database system.

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(c) Triggers anu vɪᴜ...

PURBANCHAL UNIVERSITY
2018

B.E. (Computer)/Fourth Semester/*Final*
Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32
BEG276CO: Database Management System *(New Course)*

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Answer EIGHT questions.   8×10=80

1. Explain E-R model, design E-R schema for bus ticket reservation system and also convert it into relational model [note: mention the assumption made for this design].   4+4+2

2. What is Database Management System? Explain the system architecture of Database management system with appropriate block diagram.
2+8

3(a) Explain briefly about Physical and Logical Data Independence: 4

(b) Discuss advantages of DBMS over conventional Data processing file system.
6

4. Consider the schema given below and write the relational algebra for the given scenarios.
2×5=10

   (i) Employee(employee_id,first_name,last_name,email,phone_number, job_id,salary,department_id)

   (ii) Departments(department_id,department_name,,location_id)

   (iii) Locations(location_id,street_address,postal_code, city, state, country_id)

   Write Relational algebra to:

   (i) Display name, address and their department_id whose salary is greater than 6000.

   (ii) Find location id which has all the department name.

   (iii) Increase the salary of 'Ram' by 15 percent.

   (iv) List employees email, phone number whose department's postal_code is 'KTM44604'.

   (v) Find the largest salary without using aggregation function.

5(a) With relevant example explain 1NF,2NF,3NF and BCNF.   6

(b) What is functional dependency? What are the two set of functional dependencies? How can we determine their equivalence?
                                                                 4

6. Discuss about query processing and query optimization with suitable diagram and examples.   5+5

7. Why concurrency control is needed in Transaction Management? Describe Two Phase Locking Protocol (2PL) over single phase locking mechanism with necessary example explaining its advantages and disadvantages   3+7

8(a) Discuss about different types of failures.   2

(b) Define schedule, serializability and also check whether the schedules s1 and s2 are conflict serializable or not: 8

S1: R2(A); R3(C); W3(A); W2(A); W2(B); W3(C); R1(A); R1(B); W1(A); W1(B)

S2: R1(A); R2(A); R3(A); W(A); R2(C); R2(B); W2(B); W1(C)

9(a) Explain about collision resolution technique used in hashing. 6

(b) Explain memory hierarchy with diagram   4

10(a) What is distributed model? Explain lag based recovery with example.   1+4

(b) What is ORDBMS? Explain different levels of security in database.   1+4

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Student(sno,sname,saddress,pno,pname,pduration,
{cno,cname,credit})

FDs: { sno→sname,saddress, pno

pno→pname,pduration

cno→cname,credit

6(a) Describe the need of query optimization. 4

(b) What is buffer replacement strategy? How to detect and resoulte hash collision in file organization. 2+4

7(a) What are the properties of Transaction? Why do we need concurrency control techniques? 2+3

(b) Explain how Two phase locking protocols ensures serializability but not deadlock cases. 5

8. Test serializability for given schedule. Also write equivalent serial schedule. 10

T1	T2	T3
		Read (Y)
		Read (Z)
Read (X)		
Write (X)		
		Write (Y)
		Write (Z)
	Read (Z)	
Read (Y)		
Write (Y)		
	Read (Y)	
	Write (Y)	
	Read (X)	
	Write (X)	

9(a) What are the types of failures? Differentiate deferred update and immediate update based recovery techniques. 2+4

(b) What is write-ahead logging protocol? What are the advantages shadow paging? 2+2

- The museum keeps track of artist's information like name, date of birth, death date, country of origin, epoch, main style and description. The name is assumed to be unique.

- Different exhibitions occur, each having a name, start date and end date. Exhibitions are related to all the art objects that were on display during the exhibition.

- Information is kept on other collections with which the museum interacts, including name, which is considered to be unique, type, description, address, phone and contact person.

3(a) Write SQL for following queries on schemas as: 1+1+1+1+1

Employee(ssn,name,address,salary,age,mgrssn,dno)

Department(dno,dname,location)

Project(pno, pname,plocation,manager_name)

Works(ssn,pno,work hours)

(i) Write DDL statements to create Employee and Works relation

(ii) List all the employees who live in Bhaktapur and work in Construction department.

(iii) Count the number of employees working in 'Ring road project';

(iv) Insert new employee in Civil department.

(v) Increase 20% salary for all employees who work for 1-IRM department

(b) Explain the importance of DBA.   5

4(a) Discuss inference rules for functional dependency.   5

(b) Compute closure set of attributes for {A} & {BC} for following relation. Also compute minimal superkey for this relation.   3+2

R(A,B,C,D,E)

FDs: {A→B, C→D, C→E}

5(a) What are the purposes of normalization? Describe join dependency.   2+3

(b) Normalize Normalize following schema of course registration by student into 3NF.   5

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Answer EIGHT questions.   8×10=80

1(a) Define data, database, database system and DBMS. Explain how 3 schema architecture ensures data independence and data abstraction.   2+5

(b) Differentiate between procedural and non-procedural database language.   3

2. Draw an ER diagram for keeping track of information for an art museum, the requirements of which are as follows (Make reasonable assumptions if required).   10

- The museum has a collection of art objects. Each art object has a unique Id, an Artist, a Year when it was created, a Title, and a Description.

- Art objects are categorized based on their type as painting, sculpture, and statue, plus another type called other to accommodate objects that do not fall into one of the three main types.

- A painting has a paint type, material on which it was drawn on, and style.

- A sculpture or statue has a material from which it was created, height, weight, and style

- An art object in the other category has a type and style.

- Art objects are also categorized as permanent collection, which are owned by the museum (these have information on the date acquired, whether it is on display or stored, and cost) and borrowed, which has information on the collection (from which it was borrowed), date borrowed, and date returned.

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Answer EIGHT questions. 8×10=80

1. Explain the importance and needs of DBMS. Describe few characteristics of modern database approach that differentiate it from traditional database systems.

2. Write down the importance of CREATE, ALTER and DROP statements in SQL. Explain using examples the following operators.

   (i) IN-NOT IN

   (ii) BETWEEN – NOT BETWEEN

   (iii) LIKE – NOT LIKE

3. What is the significance of ER diagram during conceptual database design? Construct an ER diagram for a car insurance company with a set of customers each of which owns a number of cars. Each car has a number of recorded accidents associated with it. Make any additional assumptions if required. .

4. Why normalizing a relation is necessary? Explain with example the process of normalizing a table to second and third normal forms. How does 3Nf differ from BCNF?

5. What do you mean by concurrent execution of transactions? How does two phase locking protocol handles concurrent execution? Explain conflict serializability of schedules.

6. Explain how integrity constraints help in securing a database. Discuss referential integrity constraints. Differentiate between mandatory and discretionary database access control mechanisms.

7. Consider the following EMPLOYEE table given below.

ENO	ENAME	DESIGNATION	SALARY	COMMISSION	DEPTNO
Al	Prakash	Manager	10000	1000	101
A2	Gopal	Clerk	4500		110
A3	Hari	Salesman	8000	800	102
A4	Ram	Peon	4000		101
A5	Prasanna	Clerk	4500		110
A6	Dipak	Salesman	8000	800	101

Now answer the following questions:

(a) Write SQL syntax to create the given table and insert few records in it.

(b) Write SQL syntax to update the salary of all the employees by 10% who works in department number 101.

(c) Write SQL query to retrieve all information of all Employees who does not have any commission.

(d) Write SQL query to find the deptno and employee name of all Employees who work in the same department in which employee 'A2' works.(Assume that you do not know the department number of 'A2')

(e) Write SQL query to count the distinct number of departments in the table

8. Why relational algebra is known as Procedural Query Language? Explain with example SELECT, PROJECT, JOIN and CARTESION PRODUCT operators used in relational algebra.

9. What do you mean by Database Recovery? What information is stored in log for recovery? Explain deferred update and immediate update recovery techniques.

10. Write short notes on any TWO: 5+5
    (a) Three schema Architecture
    (b) Functional dependency Vs Multivalued dependency
    (c) Query optimization

PURBANCHAL UNIVERSITY
2015

B.E. (Computer)/Fourth Semester/*Final*

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Answer EIGHT questions. $8 \times 10 = 80$

1(a) Describe three-schema architecture with a neat diagram.   5

(b) What are advantages of DBMS? Explain few DBMS languages. 5

2(a) Construct an ER Diagram for a HOSPITAL MANAGEMENT SYSTEM. Make necessary assumptions.   5

(b) Convert the ER diagram into relations.   5

3(a) Explain trigger and view with suitable example.   5

(b) Differentiate between DDL and DML.   5

4. What are relational algebra? Explain SELECT and PROJECT operation. How does Join operation differ from select or project operation?   2+6+2

5. Consider the following relations.

EMPLOYEE

FNname	MName	LName	SSN	Bdate	Address	Sex	Salary

DEPARTMENT

DName	DNumber	MGRSSN	MGR_START_DATE

DEPT_LOCATION

DNumber	Dlocation

PROJECT

PName	PNumber	PLocation	DNumber

WORK-ON

ESSN	PNumber	HOURS

DEPENDENT

ESSN	Dependent-name	Sex	Bdate	Relation

Now write SQL queries to perform the following: 5×2 = 10

  (a) Retrive name and address of all employess who works for research department.

  (b) Find the name of employee who works on all projects controlled by department number 5.

  (c) List the name of employees with two or more dependent.

  (d) Delete a tuple from employee table whose employee name is John and SSN is '12345'.

  (e) Change the salaries of all employees belonging to department number 5, raise the salary by 10%.

6. What are functional dependency? Explain normalizations & its importance in relational database design. Explain 4NF and multivalued dependency.   2+4+4

7(a) Explain various access control in database security.   5

  (b) Explain query processing and query optimization.   5

8(a) What are the needs of concurrency control? Explain various concurrency control techniques.   6

  (b) What are Crash Recovery? Explain Log-based crashed recovery technique.   4

9.   **Write short notes on any TWO:**   2 × 5 = 10
      (i) ORDBMS
      (ii) Shadow paging
      (iii) Encryption and decryption
      (iv) Buffer Management

PURBANCHAL UNIVERSITY
2014 (New)

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Answer EIGHT questions.

1. Define database, database system & database management system. Explain the characteristics of database approach.   5+5

2. What's the use of data models? Describe different types of data models with examples.   4+6

3. Write SQL for following queries.   10

    STUDENT (Sid, Sname, Saddress)
    COURSE (Cid, Cname, Credit, Instructor)
    REGISTER (Sid, Cid, Regdate)

    (a) List all the students and course registered
    (b) Delete all the students who haven't registered any course yet.
    (c) Write DDL to create COURSE relation. Check Credit is greater than 0
    (d) Display total number of students who live in 'Surkhet'.

4. Why database Normalization is needed? List out all Normalization technique and explain any TWO in brief.   2.5+2.5+5

5. What are the importance of security in database system? Differentiate mandatory access control and discretionary access control techniques.   5+5

6. Briefly describe on the working principle of buffer manager. Differentiate between hashing and Indexing.   4+6

7. What do you mean by Conceptual Model? Explain ER diagram with a neat diagram.   4+6

8. Briefly describe over different types of schedules. Give an example to test conflict serializability.   6+4–

9. What are the reasons of deadlock? Describe about deadlock prevention protocols.   4+6

10. Why do we need recovery system? Explain log based recovery techniques.   4+6