2081:

Long Answer Questions: [10 marks each]

1. What do you mean by entity type and entity set? Construct an ER diagram for an airline ticket booking system where customers buy airline tickets online. The system should provide discounts on the basis of number of tickets bought. It should also keep records of buyers on the basis of number of times buyer visits the system. It should also filter the unwanted visitors to manage traffic congestion.
2. Consider the library database schema containing the tables given below where primary keys are underlined.

   USER (UserID, User_name, Address)

   USES (UserID, BookID, Issued_date, Returned_date)

   BOOK (BookID, Book_name, Author, PublisherID)

   PUBLISHER (PublisherID, Publisher_name, Address)

   Specify the following queries in both SQL and Relational Algebra on this database schema:

   a. Retrieve names of all books issued to the user “Hari”.
   b. Retrieve the names of all books published by “ABC publication”.
   c. Count the number of books published by the author “Ram”.

3. What are desirable properties of transactions? Explain conflict-serializability with example.

Short Answer Questions: [5 marks each]

4. What do you mean by referential integrity? Why do you need this integrity?
5. Explain ANSI/SPARC three-schema architecture with suitable diagram.
6. What are informal design guidelines for relational schemas.
7. Classify database management systems based on the data model.
8. Define the terms data, database, DBMS, database system, and database catalog.
9. Explain relational algebra natural join (*) operation with example.
10. Explain deferred update approach in database recovery.
11. Explain transaction deadlock with example.
12. Define specialization. Explain disjoint constraint with example.

2080-new:

Long Answer Questions: [10 marks each]

1. Consider a banking database with three labels and primary key underlined as given below:

   Customer (CustomerID , CustomerName, Address, Phone, Email)

   Borrows (CustomerID, LoanNumber)

   Loan (LoanNumber , LoanType, Amount)

   Write both relational algebra and SQL queries:

   a. To display name of all customers who live in “Lalitpur” in ascending order of name.
   b. To count total number of customers having loan at the bank.
   c. To find name of those customers who have loan amount greater than or equal to 500000.
   d. To find average loan amount of each account type.
2. What are informal design guidelines for relational schemas? why do we need functional dependencies? Explain 2NF, 3NF with suitable example.
3. Explain deadlock with example. What are different deadlock prevention protocols? Explain deadlock detection and starvation.

Short Answer Questions: [5 marks each]

4. What are the characteristics of database approach? Explain.

5. Define data independence. Explain three-schema architecture.
6. What is specialization? What are different constraints on specialization?
7. What is relational database? Explain different characteristic of a relation. Define domain constraint.
8. What is tuple relation calculus ? Given the following schema, write tuple relational calculus for selecting name and address of employee who are working in a company having:

    Cid=E01

    Employee(Eid, Ename, Address, Cid)

    Company(Cid, CName)
9. Explain schedule based on recoverability and serializability.
10. How timestamp ordering protocol is used for ensuring concurrency control?
11. Why database recovery is essential? Explain recovery technique based on immediate update.
12. Write short notes on:
    a. Transaction processing
    b. Weak entity

Model:

Long Answer Questions: [10 marks each]

1. Consider the following database and write SQL as given:

   Customer (Cno, Cname, Caddress, Ccontact)

   Purchase (Cno, Pid)

   Product (Pid, Pname, price, quantity)

   Find the names of all products having price 1000.

   a. Find the name of those customers who purchased Dell Laptop
   b. Find the total number of products purchased by customer 'Ram'.
   c. Increase price of all products by 5%.
   d. Find total price of Apple Mobiles.

2. What are the benefits of using normalization? Discuss 1NF, 2NF, and 3NF with suitable example.
3. Define Relational Algebra and explain its six fundamental operations with suitable example.

Short Answer Questions: [5 marks each]

4. What is database schema? What are functions of database administrator?

5. Construct an E-R diagram for online course registration where students register courses online.
6. Discuss referential integrity with example.
7. What is functional dependency? Why do we need inference rules?
8. Why do we need concurrency control? Discuss two phase locking protocol.
9. Why do we need database recovery? Discuss shadow paging technique for database recovery.
10. Differentiate concept of Centralized and Client/Server Architectures for DBMSs with suitable example.
11. Define Transaction and explain its desirable properties.
12. Explain constraints and characteristics of specialization and generalization of data model.

2080:

Long Answer Questions: [10 marks each]

1. Consider a banking database with three tables and primary keys underlined as given below:

   Customer(CustomerID, CustomerName, Address, Phone, Email)

   Owns(CustomerID, AccountNumber)

   Account(AccountNumber, AccountType, Balance)

   Write both relational algebra and SQL queries:

   a. To display name of all customers who live in “Kathmandu”.
   b. To count total number of customers.
   c. To find name of those customers who have balance greater than or equal to 100000.
   d. To find average balance of each account type.

2. Define normalization. Why normalization is important in database design? Explain 1NF, 2NF and 3NF with suitable example.
3. What is two-phase locking? What are different types of locks in two-phase locking? Explain basic, conservative, strict, rigorous two-phase locking. What is lock conversion?

Short Answer Questions: [5 marks each]

4. What is flat-file system? What are the advantages of using DBMS approach?
5. Define data abstraction, data model, schemas, instances and database state.
6. What is conceptual data model? Explain different types of attributes used in ER diagram.
7. What is relational model? Define the terms domain, attribute, tuple and relation.
8. What is tuple relational calculus? Explain.
9. Define transaction. What are different desirable properties of transaction?
10. Why do we need concurrency control in databases? Explain.
11. Why database recovery is essential? Explain recovery technique based on immediate update.
12. Write short notes on:
    a. Natural join
    b. Shadow paging

2079:

Long Answer Questions: [10 marks each]

1. What is Database Management System? Explain the DBMS architecture with a diagram. What is data independence?
2. What is entities and their types? How do we reduce different types of entities and relationships of ER diagram into Tables? Explain with assuming different types of entities and relations.
3. What is normalization? Why normalization is required? Explain 1NF, 2NF, and 3NF with example.

Short Answer Questions: [5 marks each]

4. What do you mean by Schema and Instance in DBMS? Explain both with examples.
5. What is conflict schedule? Explain with example.
6. Retrieve the TName, and No_of_period of teachers who teach in "ABC" school using Relational Algebra.

   TEACHER (TID, TName, TAddress, TQualification)

   SCHOOL (SID, SName, SAddress, SPhone)

   SCHOOL_TEACHER (SID, TID, No_of Period).

7. Explain aggregation with example.

8. Define functional dependencies. Explain 2nd normal form with example.
9. Explain Assertion and Triggers with example.
10. What is concurrency control? What are its advantages in DBMS?
11. What is Buffer Management in DBMS? Explain.
12. What is transaction? Draw states of transaction and explain.

2078:

Long Answer Questions: [10 marks each]

1. What are different types of Database users and their roles? Explain the Data independence with example.
2. What are the components of ER diagram? Explain the function of various symbols used in ER diagram. Construct an ER diagram to store data in a library of your college.
3. Explain deadlock and starvation. Explain Time stamp-based protocol for concurrency control?

Short Answer Questions: [5 marks each]

4. What is difference between logical data independence and physical data independence?
5. Explain Relationship and Relationship sets with example.
6. Retrieve the TName, SName, SPhone for “ABC” school using SQL from given relation as below.

    TEACHER (TID, TName, TAddress, TQualification)

    SCHOOL (SID, SName, SAddress, SPhone)

    SCHOOL_TEACHER (SID, TID, No_of Period)

7. What is integrity? Explain different types of database integrity.
8. Define Functional dependencies. Explain trivial and non-trivial dependencies?
9. Explain the difference between “Join” and “Natural Join” of algebraic operations with example.
10. What is Checkpoints in database recovery? How does it help in database recovery? Explain.
11. Define schedule and serializability. How can you test the serializability?
12. Define Boyce-Codd normal form with example. How it is different than 3rd Normal form.

2076:

Long Answer Questions: [10 marks each]

1. What are the advantages of using Database Management System over traditional filing system? Explain different data models with example.
2. What is concurrency control? Name various methods of controlling concurrency control. Differentiate between Binary lock and shared/Exclusive lock.
3. What is normal form? Explain their types. Explain about loss-less join decomposition.

Short Answer Questions: [5 marks each]

4. What is data abstraction? What are three levels of data abstraction? Explain.
5. What is difference between Entities and Entity sets? Explain with example.
6. Create two table Courses (CID, Course, Dept) and HoD (Dept, Head) using SQL language with all constraints [Primary key, Foreign key and Referential Integrity]. Assume the types of attributes by your own.
7. Differentiate between Integrity and Security with example.
8. Define schedule and serializability. How can you test the serializability?
9. What is Granularity of data items? How does it affect concurrency control?
10. Explain 2 phase locking technique in brief.
11. What are the different approaches of Database recover? What should log file maintain in log-based recovery?

12. Explain the use of primary and foreign key in DBMS with example. What is the role of foreign key?