1. (a) Define distributed database system. What is the processing element in distributed computing system?

(b) Define each of the elements which is being distributed in distributed data processing environment.

(c) Describe how improved performance can be achieved in distributed database system.

(d) Explain the alternative approaches to place the database and applications across different sites for distributed database design.

1. (a) Define the terms i) autonomy ii) distribution

(b) What is the significance of (A0, D2, H1)

(c) Describe distributed database reference architecture for peer-to-peer distributed database system.

(d) Show the components of the distributed DBMS using a diagram.

1. (a) Describe top-down design strategies for designing distributed database.

(b) Write down the advantages of fragmentation

(c) Explain the use of reconstruction rule to ensure the correctness of fragmentation

(d) Describe how primary horizontal fragmentation can be obtained using the PHORIZONTAL algorithm.

1. (a) Explain the heuristic approaches for the vertical fragmentation of global relations.

(b) What is semantic integrity control? Define semantic integrity constraints.

(c) Explain how views can provide data security. Create a view to see the employee details of a particular Job Title.

(d) Define different aspects of data security.

1. (a) What is integrity constraint? Specify the following constraints for the given database where the primary keys are underlined:

*Emp*(**eno**, ename, title), *proj*(**pno**, pname, budget), *asg*(**eno, pno**, resp, dur)

1. The employee number functionally determines the employee name.
2. Only the tuples whose budget is 0 may be deleted.
3. The project no *pno* in relation *asg* is a foreign key matching the primary key *pno* of relation *proj*.

(b) What do you mean by integrity enforcement? Describe the ENFORCE algorithm.

1. (a) What is a query processor? Write down the characteristics of a query processor.

(b) What are the main layers of query processing? Draw the layering scheme for distributed query processing.

(c) Write down the steps of query decomposition.

(d) Explain how local query optimization is achieved in distributed query processing.

1. (a) Define normalization. Explain how an SQL query can be converted to normal forms with example.

(b) Describe how the rewriting step can be applied to a given query.

(c) What is multimedia database? Describe the organization of the multimedia data based on the principle of uniformity.

1. (a) Define query optimization. What are the components of a query optimizer?

(b) Define cost function with respect to total time and response time.

(c) Define the terms for INGRES algorithm: i) substitution ii) detachment

(d) Define data mining for distributed database environment.