Q. P. Code: 18508

(3 Hours) **Total Marks: 80**

N.B.: (1) Question No.**1** is **compulsory**.
(2) Solve any **three** questions out of the remaining questions.
(3) Make **suitable** assumptions if **needed**.

1. (a) Describe Data Independence. **5**
(b) Compare File System and Database System. **5**
(c) Explain ACID properties. **5**
(d) Explain Aggregate Functions in SQL. **5**

2. (a) Define Normalization. Discuss different Normalization Techniques with example. **10**
(b) Describe the overall architecture of DBMS with suitable diagram. **10**

3. (a) Explain types of integrity constraints with example. **10**
(b) Draw an ER Diagram and convert it into relational model for a Company, which has several Employees working on different types of Projects. Several Employees are working for one Department, every Department has a Manager. Several Employees are supervised by one Employee. **10**

4. (a) Discuss Data Definition and Manipulation Commands in SQL. **10**
(b) Explain Security and Authorization in DBMS. **10**

5. (a) Explain the following Relational Algebra Operations with example: **10**
i. Cartesian Product iii. Project
ii. Natural Join iv. Union

(b) Explain Log based recovery and shadow paging in detail. **10**

6. Write Short notes on: **20**
(a) Steps in Query Processing
(b) Role of Database Administrator
(c) Deadlocks
(d) Specialization and Aggregation

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