

N.B. : 1. Question no. 1 is **Compulsory**.

2. Solve any **Three** questions out of remaining **Five** questions.

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|------|--|----|
| Qu-1 | a) Justify the term Data Independence.   | 5  |
|      | b) Explain Weak Entity with example.   | 5  |
|      | c) Explain programming with JDBC.  | 5  |
|      | d) List aggregate functions and justify the need of any two aggregate functions.   | 5  |
| Qu-2 | a) With reference to figure-1 list and explain the Attributes, Keys, Relationship types.   | 10 |
|      | b) Explain Illustrate relational algebra with example.   | 10 |
| Qu-3 | a) Explain Functions and Procedures in SQL with suitable example.  | 10 |
|      | b) Illustrate sparse and dense indexing with suitable example.   | 10 |
| Qu-4 | a) Describe/list the steps/rules of ER-to-relational mapping and use the same to map the ER diagram shown in figure-1 to relational database schema.                       | 10 |
|      | b) Use the relational database schema of Qu-4 a) and write the following queries.  | 10 |
|      | i) Retrieve the birthdate and address of the employee(s) whose name is 'Vaidehi Chavan'.   |    |
|      | ii) Retrieve the name and address of all employees who work for the 'Research' department.   |    |
|      | iii) For every project located in 'Mumbai', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.    |    |
|      | iv) Retrieve a list of employees and the projects they are working on, ordered by department and, within each department, ordered alphabetically by last name, first name. |    |
| Qu-5 | a) Explain Event Condition Action (ECA) model with suitable example.   | 10 |
|      | b) Illustrate the need of normalization? explain all forms with an example.  | 10 |
| Qu-6 | Attempt the following.   |    |
|      | a) Functional Dependencies   | 5  |
|      | b) Operation on Files  | 5  |
|      | c) Foreign Key   | 5  |
|      | d) Views in SQL  | 5  |

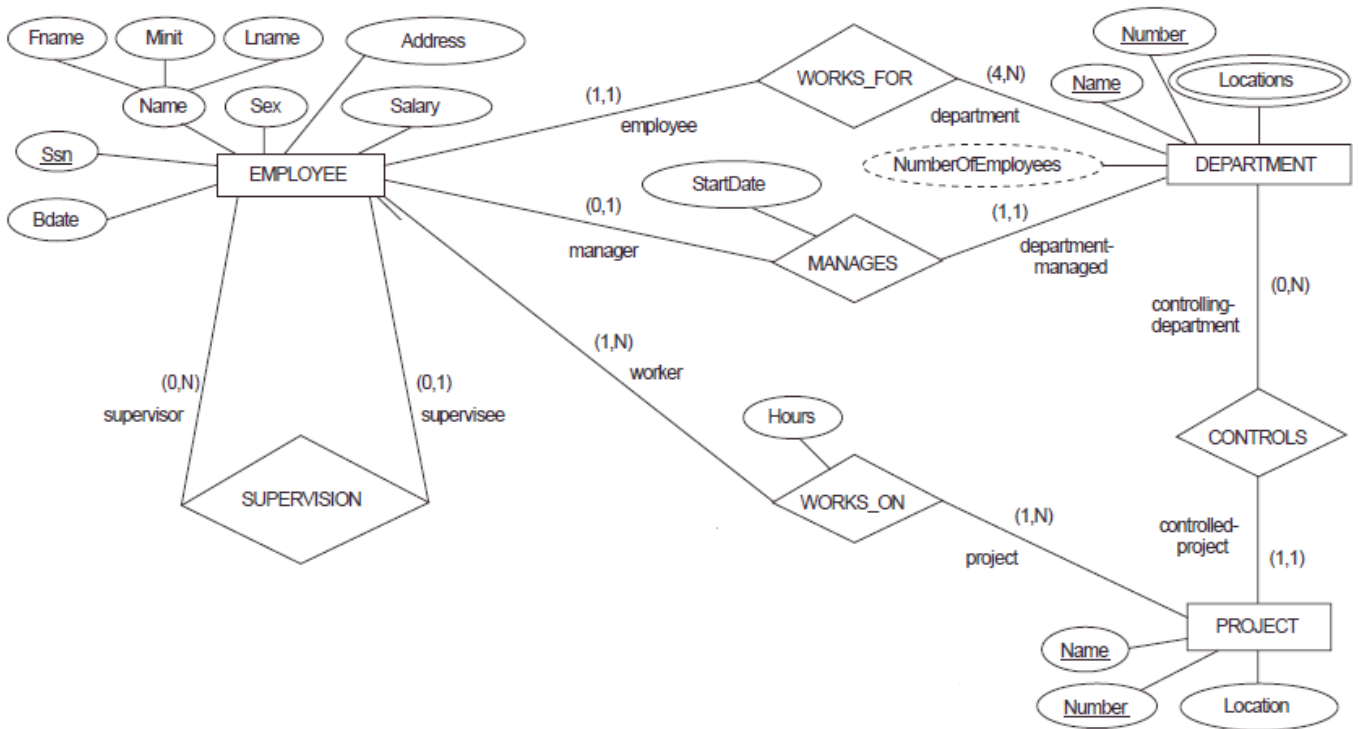


Figure-1 ER diagram for the COMPANY schema, with all role names and constraints on relationships.