VIT®
BHOPAL
www.vitbhopal.ac.in

MID TERM EXAMINATIONS – July 2024

Programme	: B.Tech.	Semester	: Fall Semester 2024-2025
Course Title	: Database Management Systems	Course Code	: CSE3001
Date/Session	: 19 July 2024/ Session I	Slot	: A14+B14+C14+E14+F14
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks

1. Define and explain following terms with the help of an ER diagram example: **10**
   (i) Weak entity type
   (ii) Participation constraint
   (iii) Cardinality ratio
   (iv) Recursive relationship
   (v) Specialization
   (vi) Generalization

2. With a neat and clean block diagram explain the architecture of a typical DBMS.   **10**

3. a. Consider following relational database schema set: **10**

   EMPLOYEE (FName, LName, SSN, Salary, SuperSSN, Gender, DNo)
   DEPARTMENT (DNo, DName, SuperSSN)
   DEPT_LOCATION (DNo, DLocation)
   DEPENDENT (ESSN, Dependent_Name, Dependent_Sex)
   WORKS_ON (ESSN, PNo, Hours)
   PROJECT (PName, PNo, PLocation, DNo)

   Where,
   SSN = Social Security Number
   SuperSSN = Manager's SSN
   MgrSSN = Manager's SSN
   DNo = Department Number
   DLocation = Department Location
   ESSN = Employee SSN
   PLocation = Project Locations

   i. Write relational algebraic expression to determine first name, last name, and address of the employees who are working in research department.
   ii. Write relational algebraic expression to determine first name, last name of the employees who are working on all the projects.

   ### OR

   b. i. Write the step-by-step process to determine minimum number of tables required in the   **10**
   database for the given ER diagram.

   ii. With suitable example formally define Primary Key, Referential Integrity, Super Key, Candidate Key, Foreign Key.
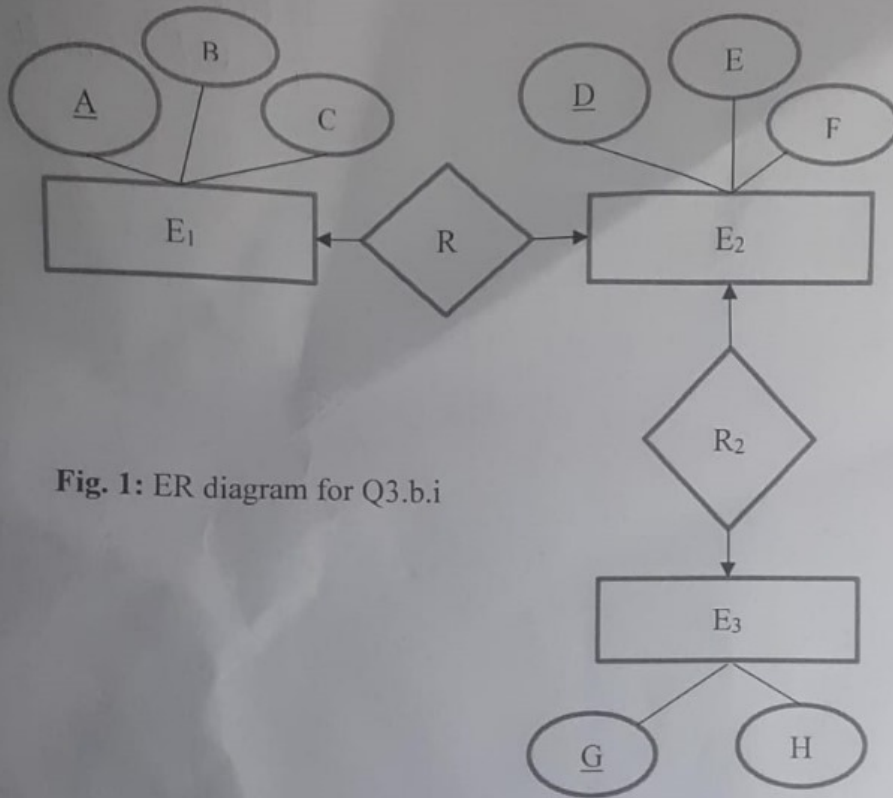
Fig. 1: ER diagram for Q3.b.i

4. Consider the universal relation R = {A, B, C, D, E, F, G, H, I, J} and the set of functional   **10**
   dependencies FD = {{A, B}→{C}, {A}→{D, E}, {B}→{F}, {F}→{G, H}, {D}→{I, J}}.
   Step-by-step determine all possible candidate keys of R?

5. Consider following relational database schema set: **10**
   Departments (**Department ID**, Department_Name)
   Teachers (**Teacher ID**, Teacher_Name, Department_ID, Salary)
   Student (**Student ID**, Student_Name, Course_ID)
   Course (**Course ID**, Course_Name, Department_ID)

   Write and explain SQL query to:
   a. List the teachers name and along with their department names.
   b. List names of the department along with their expenditure in the salary of teachers.

   ⇔⇔⇔