MIDTERM EXAMINATIONS – March, 2025

Programme	: B.Tech.	Semester	: Winter Semester 2025
Course Title	: Database Management Systems	Course Code	: CSE3001
Date/ Session	: 05 March 2025, Session I	Slot	: B11+B12+B13
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks

1 For the given ER diagram, determine the minimum number of tables required to convert it into a relational database schema, along with an explanation. Additionally, explain the different types of keys (Primary Key, Foreign Key, Candidate Key, etc.) with examples.
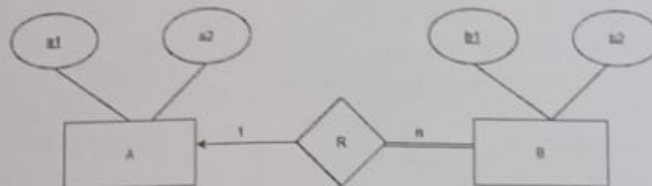
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2 Explain the following database models in detail with suitable diagrams and examples:
1. Hierarchical Model
2. Network Model
3. Entity-Relationship (E-R) Model
4. Relational Model

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Ensure that your explanation includes clear diagrams and real-world scenarios to enhance understanding.

3 (a) Find the Candidate keys for the relation $R(A, B, C, D, E, F)$ If the functional dependencies are

{
$AB \to D$
$C \to B$
$D \to CF$
$B \to E$
}

5

Provide a suitable explanation in support of your answer for each step.

(b) In the given schema with attributes A, B, C, D, and E, the following set of functional dependencies is provided:

{
$CD \to AC$
$BD \to CD$
$BC \to CD$
$AC \to BC$

5

}

Which of the above functional dependencies is not implied by the given set, and why? Provide a suitable explanation in support of your answer for each step.

4   Consider the relation R (A, B, C, D) with the following functional dependencies: AB→CD and D→B, do the following: **10**
   1. Check whether the relation R satisfies 1NF, 2NF, 3NF, and BCNF.
   2. If the relation does not satisfy a particular normal form, decompose it up to BCNF.

Provide proper rules and explanations to support your answer for each normal form.

5   A relational schema for a train reservation database is given below. Passenger (pid, pname, age) Reservation (pid, class, tid)

Table: Reservation		
Pid	CLASS	tid
0	AC	8200
1	AC	8201
2	SC	8201
5	AC	8203
1	SC	8204
3	AC	8202

Table: Passenger		
Pid	Pname	Age
0	Sachin	65
1	Rahul	66
2	Saurav	67
3	Anil	69

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Write the SQL queries for the following:
   1. Retrieve the names and ages of all passengers travelling in AC class.
   2. List the names of passengers who have reservations in more than one class.
   3. Show the train ID and the number of passengers booked for each train, ordered by passenger count in descending order.
   4. Retrieve the passenger(s) with the highest age along with their reservation details.

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