

School of Computer Science and Engineering
Fall Semester 2024-25
Model Question Paper

Programme Name & Branch : B.Tech. CSE

Course Name & code: Database Systems - BCSE302L

Class Number (s): VL2024250101509 and VL2024250101511

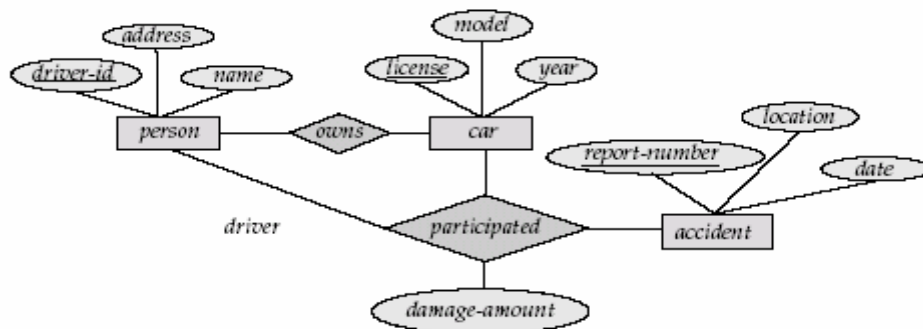
Faculty Name (s): Dr. Geetha Mary A

Exam Duration: 180 Min.

PART – A (10 * 10 = 100 Marks)

Answer any TEN Questions

1. What is three schema architecture? Are the three levels mandatory? State reasons to justify your answer.
2. Explain the components of DBMS with a neat diagram.
3. Design a relational database corresponding to the E-R diagram below. Specify the keys and foreign keys in the resulting schema.



4. List the Super keys, candidate keys, primary keys and secondary keys of the below relation.
Reason your answer.

EmpID	Name	Location
101	Tom	Delhi
102	Rahul	Chennai
103	Anu	Chennai
104	Rahul	Mumbai

5. Given the relation schema $R = (A, B, C, D, E, G)$ and the set of functional dependencies

$$F = \{A \rightarrow D, C \rightarrow B, CA \rightarrow E, B \rightarrow E\}$$

- a. find a candidate key for R.
 - b. find a lossless-join decomposition of R into BCNF.
6. Consider a student table which has information about the subjects and the activity the students have enrolled in. Subject and Activity are the two attributes that are independent of each other.
 - a. Check whether the given table is in 4NF? If not, partition the table and convert to 4NF. (5 mark)

b. If the partition tables are in 4NF, check whether it is in 5NF?

(5 mark)

<u>Student</u>	<u>Subject</u>	<u>Activity</u>
Jones	Data Structures	P01
Bella	Algorithms	P03
Bella	Computation	P06
Bella	Algorithms	P07
Bella	Computation	P08
Margot	Database	P09
Margot	Compiler	P09
Pricky	Network	P06

7. Consider the following employee database. Give an expression in the relational algebra for each of the following queries. (8)

Employee (employee-name, street, city)

Works (employee-name, company-name, salary)

Company (company-name, city)

- Find the name of each employee who works for state Bank of India (company-name).
- Find the name, street address and city of residence of each employee who works for State Bank of India and earns more than 10,000 per annum.
- Find the name of each employee who does not work for State Bank of India. Note that an employee may work for several (0 or more) companies.
- Find the name of each company located in every city in which India Bank is located.

8. Draw the initial query tree and optimize the query tree using heuristic approach for the following query:

Find the names of all faculty members in the IT department who have taught a course in 2019, along with the titles of the courses that they taught. Refer the following schema structures.

Faculty(ID, name, dept_name, salary)

Teaches(ID, course_id, sec_id, semester, year)

Course(course_id, title, dept_name, credits)

9. Consider two transactions T1, T2 and two schedules S1, S2 of T1 and T2 as given below:

S1: R1 (p); W1 (p); R2 (p); W1 (q); R2 (q); W2 (q); C1

S2: R2 (p); R2 (q); R1 (p); W1 (p); W1 (q); C1; W2 (q); C2,

Check whether the given schedules are conflict-serializable

10.

- Explain the concept of shadow paging. Why it is necessary?
- Using a state diagram, present the various states a transaction will be in.

11. Discuss the time stamp ordering protocol for concurrency control. How does strict time stamp ordering differs from basic time stamp ordering.

12. Compare various types of NoSQL Databases.