CBCS SCHEME

USN | | | | | | | | | | 18CS53

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Database Management Systems

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain three schema architecture. Why do we need mapping among schema level? How do different schema definition languages support this architecture? **(10 Marks)**

b. Construct an ER diagram for an AIRLINES database schema with atleast five entities. Also specify primary key and structural constraints, cardinalities. **(10 Marks)**

OR

2 a. Explain with neat diagram component modules of DBMS and their interactions. **(10 Marks)**

b. Explain data independence, what is the difference between procedural DML and non-procedural DML? **(10 Marks)**

Module-2

3 a. Write steps that converts ER diagram to relational model. **(08 Marks)**

b. Consider the following schema
Sailor (sid, sname, rating, age)
Boat (bid, bname, color)
Reserves (sid, bid, day)
Write queries in SQL
i) Find the names of sailors who have reserved boat number 103.
ii) Compute increments for the rating of persons who have sailed two different boats on the same day
iii) Find the names of sailors who have reserved boat 103 AND 105.
iv) Find the name and age of the oldest sailor **(12 Marks)**

OR

4 a. Explain Basic constraint that can be specified while table creation with example. **(08 Marks)**

b. Consider the following schema
Sailor (Sid, Sname, rating, age)
Boat (bid, bname, color)
Reserves (Sid, bid, day)
Write queries in SQL
i) Find the names of sailor who have reserved at least one boat
ii) Find the sids of all sailor's who have reserved red boats but not green boats
iii) Find sailors whose rating is better than some sailor called "Horatio" (use nested query)
iv) For each red boat, find the number of reservations for this boat. **(12 Marks)**

Module-3

5 a. Explain Assertions in SQL with example. How is it different from CHECK? **(06 Marks)**

b. Explain and differentiate Dynamic SQL and Embedded SQL. **(06 Marks)**

c. Draw and explain 3-tier Architecture and technology relevant to each tier. Write the advantages of 3-tier architecture over 2-tier. **(08 Marks)**

OR

6 a. What is Trigger? Explain its various components with example. **(06 Marks)**

b. Explain and differentiate SQLJ and JDBC. **(06 Marks)**

c. What is CGI? Why was CGI introduced? What are the disadvantages of an architecture using CGI scripts? **(08 Marks)**

Module-4

7 a. Discuss insertion, deletion, updation anomalies. Why are they considering bad? Illustrate with example. **(06 Marks)**

b. Find the minimal cover of the set of functional dependencies given :
$F = \{A \rightarrow BC, B \rightarrow CE, A \rightarrow E, AC \rightarrow H, D \rightarrow B\}$ **(06 Marks)**

c. Consider the schema R = ABCD, subjected to FD_S $F = \{A \rightarrow B, B \rightarrow C\}$. Determine whether each decomposition has the lossless join property with respect to F. $D_1 = \{R_1, R_2, R_3)$ $R_1 = \{A, C, D\}$, $R_2 = \{A, B\}$, R_3 $\{B, C\}$. **(08 Marks)**

OR

8 a. Which Normal form is based on transitive functional dependences? Explain the same with example. **(06 Marks)**

b. Find the minimal cover of the set of functional dependencies given :
$F = \{AB \rightarrow C, C \rightarrow A, BC \rightarrow D, ACD \rightarrow B, D \rightarrow E, D \rightarrow G, BE \rightarrow C, CG \rightarrow D, CE \rightarrow A, CE \rightarrow G\}$ **(06 Marks)**

c. Consider the schema R = ABCD, subjected to FD_S $F = \{A \rightarrow B, B \rightarrow C\}$. Determine whether each decomposition has the lossless join property with respect to F. $D_2 = \{R_1, R_2\}$ $R_1 = \{A, B, C\}$ $R_2 = \{A, D\}$. **(08 Marks)**

Module-5

9 a. Explain ARIES recovery algorithm with example. **(06 Marks)**

b. What is two phase locking protocol? How does it guarantee serializability? **(06 Marks)**

c. How shadow paging helps to recover from transaction failure? Explain. **(08 Marks)**

OR

10 a. Explain Checkpoints, transaction roll back and cascading rollback with example **(06 Marks)**

b. What is Serializability? Write an algorithm to test conflict serializability of a schedule with example. **(06 Marks)**

c. When deadlock and starvation problem occurs? Explain how these problems can be resolved. **(08 Marks)**

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