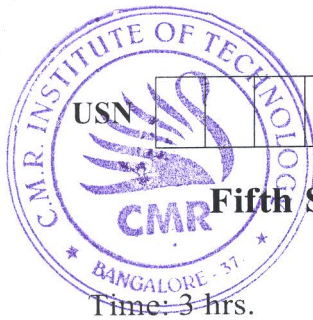


# CBBCS SCHEME



17CS53

## Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Database Management Systems

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- a. Define Database Management System. Highlight the characteristics of the DBMS approach. (10 Marks)  
b. Illustrate the different phases of database design with a neat diagram. (10 Marks)

OR

- a. Explain the three-schema architecture with a neat diagram. Why do we need mappings among schema levels? Differentiate between logical data independence and physical data independence. (10 Marks)  
b. Explain the concept of structural constraints applied on relationships during the construction of ER diagram. Give an example of each. (10 Marks)

### Module-2

- a. Explain the relational model constraints. (10 Marks)  
b. Consider the following three relations T1, T2 and T3.

T1			T2			T3	
P	Q	R	A	B	R	A	B
10	a	5	15	a	6	15	b
15	b	8	10	a	5	25	a
25	a	6	25	b	6		
			10	b	5		

Show the result of the following operations:

i)  $T_1 \bowtie_{P=A} T_3$

ii)  $T_1 - T_2$

iii)  $T_1 \div T_3$

iv)  $T_1 * T_2$

v)  $T_1 \bowtie_{P=A \text{ AND } Q=B} T_2$

(10 Marks)

OR

- a. Consider the following schema  
DIRECTOR (Did, DName, Address)  
MOVIE (Mid, MName, Year)  
DIRECT (Did, Mid)

Write the following queries in relational algebra:

i) Retrieve the Id of the movie 'WAR'.

ii) Obtain the Id of the director who has directed the movie 'JEWEL'.

iii) Obtain the names of all the movies directed by 'YOGRAJ'.

iv) Retrieve the directors who have directed more than two movies in the year 2020.

v) Retrieve the year in which maximum number of movies are released. (10 Marks)

- b. Outline the steps of the algorithm to map ER-diagram to relational model. Illustrate with an example. (10 Marks)

**Module-3**

- 5 a. Consider the following relations for a database that keeps track of student enrolment in courses and the books adopted for each course.  
 STUDENT (USN, Name, Bdate)  
 COURSE (course #, name, Dept)  
 ENROL (USN, course #, sem, grade)  
 BOOK\_ADOPTION (Course #, sem, Book ISBN)  
 TEXT (BOOK ISBN, Book title, Publisher, Authors)
- Retrieve a list of books adopted by both 'CSE' and 'ISE' departments.
  - List the number of courses taken by all students named 'Rani' in second semester.
  - Produce a list of courses offered by 'ISE' department that have used more than two books.
  - List the departments that have adopted books published by 'Pearson Publications'.
  - Retrieve the USN and names of the students who have got 'A' grade in the course 'Database Management System'. (10 Marks)
- b. Draw and explain 3-tier architecture and technology relevant to each tier. List the advantages of 3-tier architecture. (10 Marks)

OR

- 6 a. Consider the following schema:  
 EMPLOYEE (SSN, Name, address, salary, DeptNo)  
 DEPARTMENT (DNum, DName, MgrSSN)  
 PROJECT (PNO, PName, PLoc, DNO)  
 WORK-ON (SSN, PNO, Hours)  
 Perform the following operations in SQL:
- Write the referential, integrity constraint for the relations 'DEPARTMENT' and 'PROJECT'.
  - Retrieve the names and address of employees working for 'Research' department.
  - Retrieve the SSN of employees working on all the projects controlled by department number 2.
  - Retrieve the names of employees who do not work on any project.
  - Create a view to contain the number of employees and average salary in each department. (10 Marks)
- b. Define stored procedure. Explain the creating and calling of stored procedure with suitable example. (10 Marks)

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**Module-4**

- 7 a. Explain the informal design guidelines for relational schema. (10 Marks)
- b. Consider the universal relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies  $F = \{A, B \rightarrow C; B, D \rightarrow E, F; A, D \rightarrow G, H; A \rightarrow I, H \rightarrow J\}$ . What is the key of R? Decompose R into 2NF and then 3NF relations. (10 Marks)

OR

- 8 a. Define multivalued dependency. Explain 4NF with an example. (10 Marks)
- b. Define functional dependency. List and prove the inference rules. (10 Marks)

**Module-5**

- 9 a. Define a transaction. Give an example. List and explain the properties of transactions. (10 Marks)
- b. What are the isolation levels provided in SQL? Mention the violations that may be caused based on these isolation levels. (10 Marks)

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OR

- 10 a. Explain the conflicts that arise during concurrent execution of transaction. (08 Marks)
- b. Define the terms with an example for each i) Schedule ii) Serial schedule iii) Non serial schedule iv) Serializable schedule. (08 Marks)
- c. Differentiate between i) Steal v/s no steal approach ii) Force v/s no force used in database recovery terminology. (04 Marks)

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