

# CBCS SCHEME

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## Fifth Semester B.E. Degree Examination, June/July 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

- 1 a. Discuss the main characteristics of database approach over file-processing approach. (10 Marks)  
b. Explain the operations of 2-Tier and 3-Tier client/server architecture of DBMS. (10 Marks)

OR

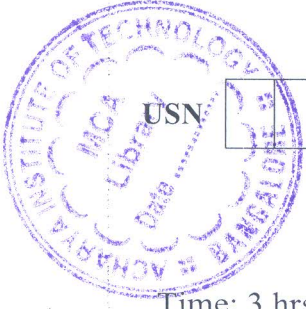
- 2 a. What is a weak entity type? Explain the role of partial key in design of weak entity type. (05 Marks)  
b. Design an ER diagram for the mail order database considering the following requirements.  
Employee takes order for parts from customers:  
i) Employees are identified by unique employee ID, first name and last name, address, gender, zip code.  
ii) Customer is identified by a unique customer ID, first and last name, address, location, zip code.  
iii) Part is identified by a unique part number, part name, price and quantity.  
iv) Order is identified by a unique order number, date of receipt, expected ship date, actual ship date. Each order contains specified quantities of one or more parts.  
v) Each customer can place number of orders and each order is placed by one customer only.  
vi) Each employee can take any number of orders but each order belongs to only one employee.  
vii) Each part is placed by number of customers and each customer can place order for number of parts.  
Write assumptions made. (10 Marks)  
c. Differentiate specialization and generalization, giving suitable examples. (05 Marks)

### Module-2

- 3 a. List and explain the different characteristics of relations. (08 Marks)  
b. With an example, discuss the basic constraints that can be specified when you create a table in SQL. (06 Marks)  
c. Write queries in relational algebra for the following: [Refer tables given in question 5(b)].  
i) Retrieve the number of dependents for an employee named "Ram".  
ii) Retrieve the name of managers working in location named "XYZ" who has no female dependents.  
iii) Retrieve the name of employee who works in the same department as that of "Raj". (06 Marks)

OR

- 4 a. Briefly discuss the different types of update operations on relational database. Give examples for the violation of referential integrity in each of the update operation. (10 Marks)  
b. With examples, explain the steps of ER to relational mapping algorithm. (10 Marks)



**Module-3**

- 5 a. What is a view in SQL? Explain with examples. Discuss the problems that may arise when one attempts to update a view. (10 Marks)
- b. Consider the following tables:  
 Employee (Name, Ssn, Salary, Superssn, Dno)  
 Department (Dname, Dno, Mgrssn, Mgrstartdate)  
 Project (Pname, Pno, Plocation, Dno)  
 Dept\_Location (DNum, Dlocation)  
 Works\_on (Essn, Pnum, Hours)  
 Dependent (Essn, Depname, Sex)
- i) List the names of managers who have at least one dependent.  
 ii) For each employee, retrieve the employee's name and name of his or her immediate supervisor.  
 iii) For each project on which more than two employees work, retrieve the project number, project name and the number of employees who work on that project.  
 iv) Retrieve the name of employees whose salary is greater than salary of all the employees working in either department 5 or 6. (10 Marks)

**OR**

- 6 a. What is a cursor in embedded SQL? Explain with examples. (10 Marks)
- b. With examples, explain the following:  
 i) Java Script  
 ii) Style sheets. (10 Marks)

**Module-4**

- 7 a. List and explain the informal design guidelines for relation schema. (10 Marks)
- b. What are prime and non-prime attributes? Explain with examples. (04 Marks)
- c. Consider the relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies (FDs)  $F = \{AB \rightarrow C, BD \rightarrow EF, AD \rightarrow GH, A \rightarrow I, H \rightarrow J\}$ . What is the key of R? Decompose R into ZNF and 3NF relations. (06 Marks)

**OR**

- 8 a. Consider the two sets of FD's:  
 $F = \{A \rightarrow B, B \rightarrow C, AC \rightarrow D\}$  and  $G = \{A \rightarrow B, B \rightarrow C, A \rightarrow D\}$ . Show that they are equivalent. (06 Marks)
- b. Consider a relation  $R(A, B, C, D)$  with FDS =  $\{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C\}$ . Find the minimal cover for the set of FDs. (06 Marks)
- c. Write and explain the algorithm for dependency-preserving and non additive join decomposition into 3NF schemes with suitable example. (08 Marks)

**Module-5**

- 9 a. What is serializability? Explain serial, non serial and conflict-serializable schedules with appropriate examples. (10 Marks)
- b. Discuss the time stamp ordering algorithm for concurrency control. How does strict time stamp ordering differ from basic time stamp ordering? (10 Marks)

**OR**

- 10 a. What is a Deadlock? Consider the following sequences of actions listed in the order they are submitted to DBMS sequence  $S1 : R1(A), W2(B), R1(B), R3(C), W2(C), W4(B), W3(A)$ . Draw waits for graph in case of deadlock situation. (06 Marks)
- b. Explain shadow paging with suitable example. (06 Marks)
- c. Briefly explain the recovery techniques based on deferred update and immediate update. (08 Marks)

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