Total number of printed pages: **UG/4th /UCSE404**

2024

Database Management Systems

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What is the difference between 2-tier and 3-tier client/server architectures?	6
	b)	What you mean by physical and logical data independence?	6
	c)	What is Specialization and Generalization? What are the constraints with respect to Specialization/Generalization?	8
2.	a)	Design an ER diagram for an IT training group database that will meet the information needs for its training program. Clearly indicate the entities, relationships and the key constraints. The description of the environment is as follows: The company has 12 instructor and can handle up to 100 trainees for each training session. The company offers 5 advanced technology courses, each of which is taught by a team of 2 or more instructors. Each instructor is assigned to a maximum of two teaching teams or may be assigned to do research. Each trainee undertakes one advanced technology course per training session.	16
	b)	What do you mean by the term "degree of a relationship"? Explain with example.	4
3.	a)	Explain following **Relational Algebra** operations with example: Selection, Projection, Union, Intersection, Set difference.	10
	b)	What is query optimization? What is query evaluation plan? Explain the query processing steps.	10
4.		Employee (**emp_id**, fname, mname, lname, birth_date, address, sex, salary, super_id, dept_number) Department (dname, **dept_number**, mgr_id, mgr_start_date) Dept_location (**dept_number, dlocation**)	20

		Project (pname, **pnumber**, plocation, dept_number) Works_on (**emp_id, pnumber**, hours) Dependent **(emp_id, dependent_name**, sex, birth_date, relationship) Consider the above mention database where primary keys are underlined. Write the following queries in SQL. i. Find the employees names whose salary is greater than at least one employee of "Account" department.(without aggregate function) ii. Retrieve the names of all employees who work more than 10 hours in a week on the "Project_ABC" iii. Find all the employees name and date of birth who is also a manager. iv. Count number of dependents of each employee. v. Find all the employees name who work for the project of his own department.	
5.	a)	Consider the relational schema R(A, B, C, D, E) and set of functional dependencies F = { A → BC, CD → E, B → D, E→ A } Give a loss less join decomposition into BCNF of the R.	10
	b)	What is precedence graph? What is the uses of precedence graph?	4
	c)	What is multivalued dependencies? What is canonical cover? Prove that if we remove an attribute from left side of FD then the FD becomes strong.	6
6	a)	Explain ACID properties of a Transaction.	6
	b)	What you mean by Conflict and View serializable schedule? Explain it.	6
	c)	What are the uses of functional dependencies?	4
	d)	Give the example of cascadless and recoverable schedule.	4
7.	a)	For a given schedule which one of the following situation is preferable? Justify your answer. i. A schedule which may	4

		produce an inconsistent result. ii. A schedule which may enter into deadlock situation.	
	b)	What you mean by strict two phase and rigorous two phase locking protocol? What is the advantage of these two locking protocol over two phase locking protocol?	8
	c)	Explain any two timestamp based deadlock prevention scheme.	5
	d)	In multiple granularity locking, what is the differences between implicit and explicit locking?	3