



B.TECH DEGREE EXAMINATIONS: MAY/JUNE 2023

(Regulation 2018)

Fourth Semester

INFORMATION TECHNOLOGY

U18ITI4303: Database Management Systems

COURSE OUTCOMES

CO1: Outline an ER model for a defined problem

CO2: Explain the basic concepts of query processing and query optimization algorithms.

CO3: Describe the concepts of transaction and storage management

CO4: Explain the basic concepts of database security and NoSQL

CO5: Design a database for a given problem.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	What is physical data independence? Why it is important?	CO1	[K ₂]
2.	Consider the following schema: Suppliers(Sid,Sname,Saddress) Parts(Pid, Pname,Pcolor) Catalog(Sid,Pid,Pcost) Find the names of suppliers who supply some Green part.	CO1	[K ₃]
3.	Compare between domain relational calculus and tuple relational calculus.	CO2	[K ₂]
4.	How will you estimate the cost of a query in DBMS?	CO2	[K ₂]
5.	Consider a hash table of size seven, with starting index zero, and a hash function $(3x + 4) \bmod 7$. Assuming the hash table is initially empty, Calculate the contents of the table when the sequence 1,2,3, 8, 10 is inserted into the table using closed hashing.	CO3	[K ₃]
6.	Given relation Employee (Empno, Ename, address, Deptno, DName). Write two correct functional dependencies.	CO5	[K ₃]
7.	Why is a relation with many NULLs considered to be bad?	CO5	[K ₂]
8.	Consider the schedule $r_2(X); w_2(X); r_3(X); r_1(X); w_1(X)$ with three transactions (1,2 and 3) using read and write on a data item X, denoted by $r(X)$ and $w(X)$ respectively. Is it conflict serializable? How?	CO3	[K _L]

9.	What is SQL injection? How to prevent it?	CO4	[K _L]
10.	Outline the advantages of NoSQL databases over relational databases.	CO4	[K _L]

**Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)**

11.	a)	Explain the three schema architecture with a neat diagram .Discuss the need for mapping between schema levels.	8	CO1	[K ₂]
	b)	Construct an E-R diagram for a Car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.	8	CO1	[K ₃]
12.	a)	What is normalization? Explain 2NF and 3NF with a suitable example. Show the various normalization steps.	8	CO5	[K ₂]
	b)	Consider the employee database following tables: Employees (Emp_ID, Emp_Name, Job_Name, Manager_ID, Hire_Date, Salary, Commission,Dept_ID) Salary_Grade(Grade,Min_Salary,Max_Salary) Dept(Dept_ID,Dept_Name,Dept_Location) i. Write a SQL query to find the average salary and average total remuneration (salary and commission) for each type of job. ii. Write a SQL query to display the unique department with jobs. iii. Write a SQL query to list the details of the employees along with the details of their departments. iv. Write a SQL query to display the department details of a given employee.	8	CO5	[K ₃]
13.	a)	What is query optimization? Explain how query optimization is performed with an example.	10	CO2	[K ₂]
	b)	What is a query? Discuss the steps involved in query processing.	6	CO2	[K ₂]
14.	a)	What is a transaction? List the ACID properties. Explain the usefulness of each.	8	CO3	[K ₂]

Please indicate knowledge level (K₁toK₆) and Course Outcome level (CO1 to CO5) against each question for each subdivision.

	b)	What is a lock? What are the different types of locks? Explain the two phase locking for concurrency control in detail.	8	CO3	[K ₂]
15.	a)	Explain in detail about Key-Value and document based architecture in NoSQL.	8	CO4	[K ₂]
	b)	What is access control? Explain the working of DAC and MAC access control mechanisms.	8	CO4	[K ₂]
16.	a)	What is RAID? Briefly explain different levels of RAID. Discuss the factors to be considered in choosing RAID levels.	10	CO3	[K ₂]
	b)	Discuss the various pitfalls in a relational database design using a sample database.	6	CO2	[K ₂]

Please indicate knowledge level (K₁toK₆) and Course Outcome level (CO1 to CO5) against each question for each subdivision.