Exam.Code:0915
Sub. Code: 33422

2124

B.E. (Computer Science and Engineering)
Third Semester
CS-302: Database Systems

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. 1 (Section-A) which is compulsory and selecting two questions each from Section B-C.

x-x-x

	Section-A	
Q1.	a) Define database. Illustrate with the help of suitable diagram regarding steps involved in database access. b) Define Locks. What are the two modes of locking? c) Let a Relation R have attributes {a1, a2, a3,...,an}. Find Super key of R. d) In the following, single-row subquery, what message_____ will be displayed on the screen when there is no such name called 'Harsh' found in the employee table. *Select name, job-id from employee where job-id = (select job-id from employee where name = 'Harsh');* e) Differentiate between deferred and immediate log-based recovery technique.	10
	Section-B	
Q2.	Explain the following with suitable examples: a) Three levels of data abstractions in DBMS b) Multi-row sub-query vs. multi-column sub-query c) Integrity rules of DBMS d) File System vs. Database System e) Relational model vs Hierarchical model	10
Q3.	a) Write a short note on query optimization in DBMS. b) Consider table EMP (ENO, ENAME, JOB, AGE, SALARY, COMMISSION, DEPTNO). Create a trigger on the EMP table, which shows the old and new values of ENAME after every updation on the ENAME of the EMP table.	5 5
Q4.	a) A university registrar's office maintains data about the following entities: (i) courses, including number, title, credits, syllabus, and pre-requisites. (ii) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom; (iii) students, including student-id, name, and program; and (iv) instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints b)Differentiate between Relational Algebra and Relational Calculus.	7 3
	Section-C	
Q5.	a) Consider a relation EMP(emp_id, dept_id, ename, mgr_id, age) where the following functional dependencies hold. *(emp_id, dept_id) →ename, emp_id→mgr_id, emp_id→age, mgr_id→age.* (Assume all the attributes having atomic values.) (i) State whether an update anomaly can occur in the relation EMP or not with proper reason.	6

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	(ii) State in which normal form is EMP now by identifying the prime and non-prime attributes. Convert it to higher normal forms till BCNF, stating that lossless join is satisfied at each normal form.	
	b) Define term functional dependencies. Explain various functional dependencies with help of suitable example.	4
Q6.	a)Define two phase locking. Explain with examples how Strict and Rigorous 2-PL ensures cascadeless but not able to handle deadlock.	4
	b) Check whether given schedule S is conflict serializable or not. If yes, then determine all the possible serialized schedules-	6

T1	T2	T3	T4
			R(A)
	R(A)		
		R(A)	
W(B)			
	W(A)		
		R(B)	
	W(B)		

Q7.	a) What is the role of checkpoints in database recovery, and how do they improve the efficiency of the recovery process? Explain with help of suitable examples.	6
	b) Define digital signature. What is the role of digital signatures in ensuring data integrity and authenticity in DBMS?	4

x-x-x