Code No. : 14243

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (C.S.E./AIML) IV-Semester Main & Backlog Examinations, July-2022
Database Management Systems

Time: **3 hours**   Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Differentiate Two-tier and three-tier architecture of database system.	2	2	1	1,2
2.	How weak entity set can be connected to a strong entity set? Give an example.	2	1	1	1,2
3.	Convert the Given E-R Model in to Relational Model.	2	2	2	1,2,3
4.	Write a Relational algebra query to find all customers of the bank who have an account but not a loan in bank database. Schema is given below Customer (Cid, Cname, Ccity) Borrower (Cid, Loanno) Depositor (Cid, accountno) Account (accountno, balance) Loan (Loanno, amount)	2	2	2	1,2,3
5.	Define Super key, Candidate key and primary key with example?	2	1	3	1,2
6.	What is a Trigger and what are the several types of Triggers?	2	1	3	1,2
7.	What is a Transaction and What are Transaction Properties?	2	1	4	1,2
8.	Draw the Transaction State diagram and write the possible cases that when the transaction can go to failed state?	2	2	4	1,2
9.	What is locking protocol? How two-phase locking Protocol guarantees the serializability?	2	1	5	1,2
10.	How Log record will be maintained in recovery Sub system?	2	1	5	1,2

Part-B (5 × 8 = 40 Marks)

11. a)	Draw the Data base Management System architecture and explain.	4	2	1	1,2

b)	Draw an ER diagram that captures the following information	4	3	1	1,2,3	

A company database needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dna, with dname and budget as attributes), and children of employees (with name and age as attributes).Employees work in departments; each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known.

12. a)	Explain the fundamental Relational Algebra operations with examples.	4	2	2	1,2	
b)	Write the following queries in SQL, using the university schema.	4	3	2	1,2,3	

Classroom (building, room- number, capacity)

Department (dept- name, building, budget)

Course (course- id, title, dept name, credits)

Instructor (ID, name, dept name, salary)

Section (course-id, sec-id, semester, year, building, room number, time-slot id)

Teaches (ID, course-id, sec-id, semester, year)

Student (ID, name, dept-name, tot-cred)

Takes (ID, course-id, sec id, semester, year, grade)

Advisor (s-ID, i-ID)

time slot (time-slot id, day, start time, end time)

prereq (course-id, prereq-id)

a) Find the names of all students who have taken at least one Comp. Sci. course; make sure there are no duplicate names in the result.
b) Find the IDs and names of all students who have not taken any course offering before Spring 2009.

13. a)	What is the importance of Normalization and Explain 1NF,2NF with examples?	4	2	3	1,2	
b)	Given a relation R (P, Q, R, S, T, U, V, W, X, Y) and Functional Dependency set FD = {PQ → R, PS → VW, QS → TU, P → X, W → Y}, determine whether the given R is in 2NF? If not convert it into 2 NF.	4	3	3	1,2,3	
14. a)	Write the steps to check whether given schedule is conflict serializable or not?	4	3	4	1,2,3	

T_1	T_2

read_item(X);
$X := X - N$;
write_item(X);	

	read_item(X);
	$X := X + M$;
	write_item(X);

read_item(Y);
$Y := Y + N$;
write_item(Y);	

			M	L	CO	PO
	b)	Construct a B+ tree for the following set of key values where number of pointers are 4. (2,5,7,10,13,16,20,22,23,24).	4	3	4	1,2,3
15.	a)	What is a recoverable schedule? Why recoverability of schedule is desirable? Explain ARIES algorithm.	4	2	5	1,2

	b)	Draw the wait for graph to detect deadlock situation for the given case
		   i) If Transaction T2 is waiting for Transaction T8
		   ii) If Transaction T5 is waiting for Transaction T2
		   iii) If Transaction T7 is waiting for Transaction T2
		   iv) If Transaction T5 is waiting for Transaction T7
			4	3	5	1,2,3

16.	a)	Explain different types of joins with suitable example.	4	2	1	1,2

	b)	Consider the bank database where the primary keys are underlined.
		Branch (<u>branch-name</u>, branch city, assets)
		customer (<u>customer- name</u>, customer street, customer city)
		loan (<u>loan-number</u>, branch-name, amount)
		borrower (<u>customer- name, loan- number</u>)
		account (<u>account- number</u>, branch name, balance)
		depositor (<u>customer- name, account -number</u>)
		Construct the following SQL queries for this relational database.
		  a) Find the names of all customers who live on the same street and in the same city as "Smith".
		  b) Find the names of all branches with customers who have an account in the bank and who live in "Harrison".
			4	3	2	1,2,3

17.		Answer any *two* of the following:				
	a)	Differentiate Embedded SQL and Dynamic SQL.	4	2	3	1,2
	b)	Suppose that we are using extendable hashing on a file that contains records with the following search-key values: 5, 3, 21, 9, 1, 13, 2,7,10,12,4,8 Show the extendable hash structure for this file if the hash function is $h(x) = x \bmod 8$ and buckets can hold three records.	4	3	4	1,2
	c)	What is lock table & how do we implement lock table?	4	1	5	1,2

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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