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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

V Semester B. E. Examinations March / April-2023

Computer Science and Engineering

DATABASE DESIGN

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART-A

1	1.1	Define Primary key.	01
	1.2	Define database snapshot.	01
	1.3	Define Minimum cardinality constraint.	01
	1.4	Define Data.	01
	1.5	What is prime attribute?	01
	1.6	What is recursive Relationship?	01
	1.7	What are System Logs?	01
	1.8	What do you mean by Relationship among entities?	01
	1.9	Define multi-valued dependency.	02
	1.10	Define Virtual table.	01
	1.11	What is Identifying Relationship? Give example.	01
	1.12	What is null attribute?	01
	1.13	What is check point?	01
	1.14	What is Schema less database?	01
	1.15	Find $\{Ssn, Pnumber\}$ + for the following FDs given. $F = \{Ssn \rightarrow Ename, Pnumber \rightarrow \{Pname, Plocation\}, \{Ssn, Pnumber\} \rightarrow Hours\}$.	02
	1.16	What is cautious waiting?	01
	1.17	Displayed schema is called as _____.	02

log to keep track of all transaction operations that affect the values of database items, as well as other transaction information that may be needed to permit recovery from failures

checkpoint in a database management system (DBMS) is a mechanism to minimize the work required during recovery in case of a failure. It acts as a snapshot of the database at a particular point in time. The checkpoint records the state of the database, including all active transactions and their progress, which allows the recovery process to restart from a more recent point instead of replaying the entire transaction log

Cautious waiting is a concurrency control technique used to prevent deadlocks in databases. In this approach:.

PART-B

2	a	Explain Component modules of $DBMS$ with a neat diagram	08
	b	Draw an ER-diagram for a $HOSPITAL$ database system. Assume your own entities (maximum of 5 entities), also identify Weak entity, cardinality ratios and participation constraints.	08
3	a	$SAILORS$ ($sid: integer, sname: string, rating: integer, age: real$) $BOATS$ $(bid: integer, bname: string, color: string)$ $RESERVES$ $(sid: integer, bid: integer, day: date)$	

		For Above given database, write Relational algebra queries for the following: i) Find the Name of sailors who sails boat id 100. ii) Find the Name of sailors who has reserved red boats. iii) Find the Name of sailors who has reserved Red or Green boats. iv) Find the Name of sailors who has reserved Red and as well as Green boats.5 v) Find the id of sailors who has not reserved Red boats and age is greater than 35.	10
	b	Discuss *INSERT* and *UPDATE* anomalies with an example for each.	06
		OR	
4	a	Explain the following with example with respect to relational algebra with example: i) *CROSS JOIN* operation ii) *INTERSECTION* can be expressed as $R \cap S = RUS - (R - S) - (S - R)$	08
	b	Explain the following *JOIN* operations with an example: i) *NATURAL JOIN* ii) *LEFT OUTER JOIN* iii) *RIGHT OUTER JOIN* iv) *INNER JOIN*	08
5	a	What is the need for normalization? Explain $1NF, 2NF$ and $3NF$ with examples.	10
	b	Discuss in detail the inference rules for functional dependencies.	06
		OR	
6	a	For below database keeps track of auto sales in car dealership,Solve these queries using *SQL*. $emp(Name, ssn, Address, sex, salary, dno)$ $dept(Dname, Dnum, Mgrssn, Mgrstartdate)$ $dept\_loc(Dnum, Dloc)$ $project(Pname, Pnum, Ploc, Dnum)$ $works\_on(essn, pno, hrs)$ $dependent(essn, Dep\_name, Sex, Bdate, Relation)$ i) Retrieve all employees whose address is in 'tumkur'. ii) (Show the resulting salaries if every employee working on the 'aaa' project is given a 10 percent raise. iii) Display dnum, name of an emp, and pno for all the employees who work on projects which belongs to their department. iv) Display all the employees who have 2 or more dependents	10
	b	Explain aggregate operations in *SQL* with examples.	06
7	a	Solve following queries in MongoDB for Employee collection. i) Create a collection by name "Employee". ii) Insert two records at once with the following fields: $SSN, Name, Salary, Age$ and $Department$. iii) Find a student record with SSN "001". iv) Remove a employee record by name "Sangam". v) Update the employee record with Age value set to 25.	10

Armstrong's Axioms and their derived rules enable database designers to infer all valid dependencies, determine attribute closures, and create well-structured database schemas

Inference Rules for Functional Dependencies
Inference rules for functional dependencies, also known as Armstrong's Axioms, are a set of sound and complete rules used to infer all functional dependencies logically implied by a given set of functional dependencies. These rules are fundamental in database theory, particularly for normalizing database relations.

	b	Discuss the following with respect to Elasticsearch: i) Elements of Metadata. ii) Using own ID in indexing a document with example.	06
8	a	Draw a neat diagram and discuss the typical states that a transaction goes through during execution.	08
	b	Differentiate the following: i) Timestamp Ordering and Thomas Write Rule in concurrency control. ii) Steal/No steal and Force/no force approaches in recovery.	08