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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

V Semester B. E. Examinations Jan/Feb-21

COMMON FOR CS / IS

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	A relational database consists of a collection of _____.	01
	1.2	The term _____ is used to refer a row.	01
	1.3	A domain is Atomic if elements of the domain are considered to be _____ unit.	01
	1.4	In SQL the spaces at the end of the strings are removed by _____ function.	01
	1.5	If we want to retain all duplicates, we must write _____ in place of Union.	01
	1.6	What is an Entity?	01
	1.7	What are ACID properties?	02
	1.8	List different types of notations used for Attribute representation in E-R diagram.	02
	1.9	If a relation is in BCNF, then the relation should be _____.	01
	1.10	List all cordinality ration representation in E-R diagram.	02
	1.11	Define Sharding.	01
	1.12	List three layers in 3-scheme architecture.	02
	1.13	Define Serialization.	01
	1.14	List types of locks used in concurrency control.	02
	1.15	Define Namespace.	01

PART-B

2	a	Define Database. Explain the characteristics of Database	05
	b	Explain the following i) Weak entity ii) Structural constraints iii) Instance iv) Schema v) Recursive Relationship	05
	c	Discuss the characteristics of relational Database model with example.	06
3	a	Design E-R diagram for keeping track of information about “Banking” Database taking into account atleast FIVE entities.	05
	b	List and explain Integrity constraints	05
	c	Discuss the different types of update operation on relational database with an example.	06
		OR	

4	a	Consider the following schema $Sailors\ (sid;\ sname, rating, age)$ $Boats\ (bid, bname, color)$ $Reserves\ (sid, bid, day)$ Obtain the relational algebra queries for following i) Find the name of sailors who reserved green boat. ii) Find the color of the boat reserve by "Naresh". iii) Find the name of the sailor who has reserved boat 1.	06
	b	Explain the three-tier architecture with a neat diagram.	05
	c	Derive intersection and division operations using complete set of relational algebra operations.	05
5	a	Apply the minimal cover algorithm for the following functional dependency. F :{ A→ $BCDE,\ \ CD \rightarrow E$ }	05
	b	Verify whether the following functional dependencies are equivalent. F :{ A→ $C,\ \ AC \rightarrow D,\ \ E \rightarrow H$ }, G:{ → $CD,\ \ E \rightarrow AH$ }	06
	c	Consider the following schema and obtain the SQL queries. $Student\ (student\_id, sname, major, GPA)$ $Faculty\ (facult\_id, fname, dept., designation, \boldsymbol{scr})$ $Course\ (course\_id, cname, faculty\_id)$ $Enroll\ (course\_id, student\_id, grade)$ i) List the names of all students enrolled for the course 'CS_53' ii) List the names of students enrolled for the course 'CS_53' and have received 'A' grade. iii) List all the department having an average salary of above Rs. 20000. iv) List the names of all faculty members beginning with "R" and ending with "U".	05
		OR	
6	a	Consider the following schema and obtain the SQL queries. $Employee\ (fname, lname, SSN, bdate, address, sal, SUPERSSN, dno)$ $Project\ (fpname, Pnumber, Ploaction, dnum)$ $Workson\ (essn, pno, hours)$ $Department\ (dname, dnumber, mgrssn, mgsstartdate)$ i) Find the sum of salaries of all employees, the maximum salary, minimum salary. ii) Retrieve the total number of employees in the company and number of employees in Research dept. iii) For each dept., retrieve dept. number, number of employees in dept. and their average salary.	06
	b	Consider the following functional dependencies $SSN \rightarrow Ename,$ $\text{Pnumber} \rightarrow \{\text{Pname, Plocation}\}\ \{SSN, Pnumber\} \rightarrow hours$ Find the closure for the set of attributes under this set of FD's. $\{SSN\}+ = ?$ $Pnumber+ = ?$ $\{SSN, Pnumber\}+ = ?$	06
	c	Consider the following table CID | CTitle | Faculty_ID | Faculty_name Find whether the table is in 1NF, 2NF and 3NF? If not Normalize the table.	05

7	a	Check whether the given schedule is conflict serializable or not. $S: R1(A), R2(A), R1(B), R2(B), R3(B), W1(A), W2(B)$	06
	b	Check whether the given schedule S is conflict serializable and recoverable or not.	
		T1 | T2 | T3 | T4 R(X) W(X) | W(X) COMMIT | COMMIT W(Y) R(Z) COMMIT R(X) R(Y) COMMIT	06
	c	List and explain desirable properties (ACID) of transaction database	05
8	a	Demonstrate with examples Aggregate data models.	06
	b	Discuss sharding and Namespace with respect to MongoDB.	05
	c	Demonstrate Peer-peer replication with an example.	05