

USN

--	--	--	--	--	--	--	--	--	--

RV COLLEGE OF ENGINEERING®
 (An Autonomous Institution affiliated to VTU)
V Semester B. E. Fast Track Examinations Oct-2020
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	For each attribute of a relation there is a set of permuted values, called the _____ of the attribute.	01																
	1.2	Characteristic of <i>DBMS</i> which allows program operation independence and program data independence is called _____.	01																
	1.3	Following table has two attributes <i>A</i> and <i>C</i> where <i>A</i> is the primary key and <i>C</i> is the foreign key referencing <i>A</i> with on delete cascade: <table><tr><td><i>A</i></td><td><i>C</i></td></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>4</td></tr><tr><td>4</td><td>3</td></tr><tr><td>5</td><td>2</td></tr><tr><td>7</td><td>2</td></tr><tr><td>9</td><td>5</td></tr><tr><td>6</td><td>4</td></tr></table>	<i>A</i>	<i>C</i>	2	4	3	4	4	3	5	2	7	2	9	5	6	4	
	<i>A</i>	<i>C</i>																	
	2	4																	
	3	4																	
	4	3																	
	5	2																	
	7	2																	
	9	5																	
6	4																		
	The set of tuples that must be additionally deleted to preserve referential integrity when the tuple (2,4) is deleted	02																	
1.4	If <i>E</i> ₁ and <i>E</i> ₂ be two entities in an <i>ER</i> diagram with single-valued attributes <i>R</i> ₁ and <i>R</i> ₂ are two relationships between <i>E</i> ₁ and <i>E</i> ₂ , where <i>R</i> ₁ is one-to-many and <i>R</i> ₂ is many-to-many. <i>R</i> ₁ and <i>R</i> ₂ do not have any attributes on their own. What is the minimum number of tables required to represent this selection in the relational model?	02																	
1.5	Consider the relations <i>r</i> ₁ (<i>P, Q, R</i>), <i>r</i> ₂ (<i>R, S, T</i>) with primary keys <i>P</i> and <i>R</i> respectively. The relation <i>r</i> ₁ contains 2000 tuples and <i>r</i> ₂ contains 2500 tuples. The max size of the form <i>r</i> ₁ ⋈ <i>r</i> ₂ is _____.	02																	
1.6	Consider the following relational schemes for the library database: <i>Book</i> (<i>Title, Author, Catalog_no, Publisher, Year, Price</i>) <i>Collection</i> (<i>Title, Author, Catalog_no.</i>) with the following <i>FD</i> 's a) Title, Author → <i>Catalog_no</i> b) <i>Catalog_no</i> → Title, Author, Publisher, year c) Publisher, Title, Year → Price Assume {Author, Title} is the key for both schemes which normalized from the relation <i>Book</i> and <i>collection</i> is?	02																	

1.7	Differentiate between <i>3NF</i> and <i>BCNF</i> .	02
1.8	MangoDB is _____ database. The concatenation of the collection name and database name is called _____.	02
1.9	The database system must take special actions to ensure that hamstadins operate properly without interference from concurrently executing database statements. This property is referred as _____.	02
1.10	List any two ways of searching in elastic search?	02
1.11	What is check point and when does it occur?	02

PART-B

2	a	If you were designing a web based system online to make airline reservations and sell tickets, design and summarize the schema architecture preferred by you with the help of a neat diagram.	08
	b	Sketch with a neat diagram, the database system environment by mentioning <i>DBMS</i> component modules. Explain in brief.	08
3	a	Draw the entity-relationship diagram for the following scenario A sales person may manage many other salespeople. A sales person is managed by only one salespeople. A sales person can be an agent for many customers. A customer is managed by one salespeople. A customer may place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers. Apply the cardinals ratio for the <i>ER</i> diagram.	08
	b	Consider the following schema: Student(<u>SID</u> , SurName, first Name, Campus, email, cgpa) Course(<u>dept</u> , <u>CNum</u> , name, breadth) offering(<u>OID</u> , dept, CNum, term, instructor) Took(<u>SID</u> , <u>OID</u> , grade) Note: A course may or may not satisfy the “breadth requirement” Write a relational algebraic queries for the following i) Retrieve the names of all students who have passed a breadth course with professor picky. ii) Retrieve the SID of students who have earned a grade of 85 or more, or who have passed a course taught by Atwood.	08
OR			
4	a	Consider the following schema: Write the relational algebraic expression for the following queries. Suppliers(sid:integer, sname:string, address:string) parts: (<u>pid:integer</u> , pname:string, color:string) catalog(<u>sid:integer</u> , <u>pid:integer</u> , cas:real) i) Find the pids of the most expensive part supplied by the supplier “yoremite sham”. ii) Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.	08

	b	Derive intersection and diversion operation from complete set of relational algebra operations.	08		
5	a	Consider the following schema employee(<u>employee_name</u> , street, city) works(<u>employee_name</u> , company_name, salary) company(<u>company_name</u> , city) manager(<u>employee_name</u> , manager name) Write nested <i>SQL</i> query for the following i) Find the names, street address and cities of residence of all employees who work for First Bank corporation and earn more than \$10,000 ii) Find all companies located in every city in which small bank corporation is located. iii) Find the company that has the most employees	10		
	b	Find the minimal cover for the following <i>FD</i> 's $F = A \rightarrow B, ABCD \rightarrow E, EF \rightarrow G, EF \rightarrow H, ACDF \rightarrow G$. Show the steps needed to find the minimal cover? <div>OR</div>	06		
6	a	Consider the relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and a set of <i>FD</i> 's $F = A, B \rightarrow C, A \rightarrow D, E, B \rightarrow F, F \rightarrow G, H, D \rightarrow I, J$ What is the key for <i>R</i> ? Decompose <i>R</i> into 2 <i>NF</i> and then to 3 <i>NF</i>	06		
	b	Given the following schema: employees(emp_id, first_name, last_name, hire_date, dept_id, salary) department(dept_id, dept_name, manager_id, location_id) Write a <i>SQL</i> query to display the last names and hire dates of all latest hires in their respective departments in the location <i>ID1700</i>	06		
	c	Explain correlated query with example.	04		
7	a	Explore the advantages of MongoDB over <i>RDBMS</i> .	06		
	b	Create a database 'student' in MongoDB and insert a row in it.	02		
	c	Discuss the concepts of <i>SHARDS</i> and <i>REPLICAS</i> in elastic search.	08		
8	a	Consider the following two transactions: $T_1 \propto T_2$ <table><tr><td>T_1: read(<i>A</i>); read(<i>B</i>); if $A = 0$ then $B \leftarrow B + 1$; Write(<i>B</i>);</td><td>T_2: read(<i>B</i>); read(<i>A</i>); if $B \neq 0$ then $A \leftarrow A + 1$; Write(<i>A</i>);</td></tr></table>	T_1 : read(<i>A</i>); read(<i>B</i>); if $A = 0$ then $B \leftarrow B + 1$; Write(<i>B</i>);	T_2 : read(<i>B</i>); read(<i>A</i>); if $B \neq 0$ then $A \leftarrow A + 1$; Write(<i>A</i>);	
T_1 : read(<i>A</i>); read(<i>B</i>); if $A = 0$ then $B \leftarrow B + 1$; Write(<i>B</i>);	T_2 : read(<i>B</i>); read(<i>A</i>); if $B \neq 0$ then $A \leftarrow A + 1$; Write(<i>A</i>);				
	b	Using shared and exclusive locks, show how the above transactions can be executed concurrently to strict 2 phase locking. Consider the following two transactions and schedule. In this schedule conflict-serializable? Explain why or why not? <div><div>T_0 $r_0(A)$ $w_0(A)$ $r_0(B)$ $w_0(B)$ C_0</div><div>T_1 $r_1(A)$ $r_1(B)$ C_1</div></div>	08		
			08		

