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**RV COLLEGE OF ENGINEERING®**  
 (An Autonomous Institution affiliated to VTU)  
**V Semester B. E. Fast Track Examinations July-19**  
**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	_____ is concerned with rearrangement and possible reordering of operations, use of correct algorithms and indexes during execution of queries in component modules of <i>DBMS</i> .	01
	1.2	Capacity to change internal schema without having to change conceptual schema is called _____.	01
	1.3	Justify with example that weak entity type always has a total participation constraint with respect to its identifying relationship.	02
	1.4	Define complex attribute with example.	02
	1.5	Name any two unary and binary relational operations.	02
	1.6	What are the reasons for any attribute to be <i>NULL</i> , give example.	02
	1.7	Prove that $X \rightarrow Y, X \rightarrow Z \Rightarrow X \rightarrow YZ$ using Armstrong's rule.	02
	1.8	" <i>db.users.drop()</i> " deletes the _____ along with all of its indexes.	01
	1.9	Collections are allocated space inside each data file in chunks called _____.	01
	1.10	Node is a _____ of elastic search, while _____ consists of one or more nodes.	02
	1.11	Compare "failed state" and "terminated state" of transaction.	02
	1.12	_____ algorithm was proposed to try to reduce the number of needless aborts/ restarts in transaction processing.	01
	1.13	Two tables are needed for efficient transaction recovery are _____ and _____.	01

**PART-B**

2	a	Compare characteristics of Database approach and file system approach.	04
	b	With a neat diagram, illustrate three schema architecture.	06
	c	Design an <i>E-R</i> diagram for a <i>BANK</i> database by assuming minimum of <i>FIVE</i> entities with minimum of <i>FIVE</i> attribute each. Mention cardinality ratios and participation constraints for each relationships.	06

3	a	<p>For a given database schema, solve the following queries in relational algebra.  <i>SAILOR</i> (<i>Sid, Sname, Rating, Age</i>)  <i>RESERVES</i> (<i>Sid, Bid, day</i>)  <i>BOATS</i> (<i>Bid, Bname, color</i>)            Above schema contain <i>SAILOR</i> entity which stores details of sailors who has (<i>RESERVES</i>) reserved boat on particular day and <i>BOATS</i> entity includes details of Boats.</p> <ol style="list-style-type: none"> <li>Find the names of sailors who have reserved boat #213.</li> <li>Find the names of sailors who have reserved blue boat.</li> <li>Find the colors of boats reserved by a sailor "RAMA".</li> <li>Find the names of sailors who have reserved red or green boat.</li> <li>Find the names of sailors who have reserved at least one boat and age is greater than 20.</li> </ol> <p>b Illustrate <math>E - R</math> to relational mapping steps with example database schema.</p>	08 08
<b>OR</b>			
4	a	<p>Solve following queries in relational algebra for given database schema.  <i>Hotel</i> (<i>hotelNo, hotelName, city</i>)  <i>Room</i> (<i>RoomNo, HotelNo, type, price</i>)  <i>Booking</i> (<i>hotelNo, guestNo, dateFrom, dateTo, roomNo</i>)  <i>Guest</i> (<i>guestNo, GuestName, guestAddr</i>)</p> <ol style="list-style-type: none"> <li>List all single rooms with price below 2000 per day</li> <li>List names and address of all guests.</li> <li>List price and type of all rooms at SAGA hotel.</li> <li>List all guests currently staying at SAGA hotel.</li> <li>List all hotels.</li> </ol>	08
	b	<p>Compare following set theory operations in relational algebra with example.</p> <ol style="list-style-type: none"> <li><i>UNION</i> and <i>OUTER UNION</i></li> <li><i>INTERSECTION</i> and <i>MINUS</i>.</li> </ol>	08
5	a	<p>For a given Employee database, solve the queries in <i>SQL</i>.  <i>Emp</i> (<i>Name, Ssn, Addr, Sex, Salary, Dno</i>)  <i>Dept</i> (<i>Dname, Dnum, Mgrssn, Mgrstartdate</i>)  <i>Dept_loc</i> (<i>Dnum, Dloc</i>)  <i>Project</i> (<i>Pname, Pnum, Ploc, Dnum</i>)  <i>Works_On</i> (<i>Essn, Pno, Hrs</i>)  <i>Dependent</i> (<i>Essn, Dep_name, Sex, Bdate, Relation</i>)</p> <ol style="list-style-type: none"> <li>Retrieve all employees whose address is in 'Bengaluru'</li> <li>Show the resulting salaries if every employee working on 'XXX' project is given 10% raise.</li> <li>Display Dnum, name of employee and Pno for all employees who work on projects which belongs to their department.</li> <li>Display all the employees who have two or more dependents.</li> </ol>	08

	b	Compute the following: i) Compute closure of $A$ and $B$ with respect to $F$ $F = \{A \rightarrow B, B \rightarrow C, BC \rightarrow D\}$ ii) Compute minimal cover of $F$ $F = \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C, AC \rightarrow D\}$ iii) Prove that $F$ and $G$ are equivalent. $F = \{A \rightarrow B, B \rightarrow C, AC \rightarrow D\}$ $G = \{A \rightarrow B, B \rightarrow C, A \rightarrow D\}$ <b>OR</b>	08																				
6	a	For given database of Book dealer, solve the queries in <i>SQL</i> . <i>AUTHOR</i> ( <i>author_id</i> , <i>name</i> , <i>city</i> , <i>country</i> ) <i>Publisher</i> ( <i>publish_id</i> , <i>name</i> , <i>city</i> , <i>country</i> ) <i>Category</i> ( <i>category – id</i> , <i>description</i> ) <i>Catalog</i> ( <i>book – id</i> , <i>title</i> , <i>author – id</i> , <i>publish – id</i> , <i>category – id</i> , <i>year</i> , <i>price</i> ) <i>order-details</i> ( <i>order_no</i> , <i>book_id</i> , <i>quantity</i> ) i) Give details of authors who have two or more books in catalog and price of books is greater than average price of books in catalog and year of publication is after year 2000. ii) Find author of book which has maximum sales iii) Demonstrate how you increase the price of books published by s specific publisher by 10%.	08																				
	b	Evaluate the following: i) Prove that with example, “Every relation in <i>BCNF</i> is in <i>3NF</i> , but every relation in <i>3NF</i> is not in <i>BCNF</i> ”. ii) Prove that following decomposed relation $R$ into $R_1, R_2$ and $R_3$ is lossless decomposition with given $F$ . $R = \{A, B, C, D, E, F\}$ $R_1 = \{A, B\}$ $R_2 = \{C, D, E\}$ $R_3 = \{A, C, F\}$ $F = \{A \rightarrow B, C \rightarrow \{D, E\}, \{A, C\} \rightarrow F\}$	08																				
7	a	Evaluate the following operations with example in MongoDB. i) Adding user to collection ii) Insert a document iii) Delete all documents/data in collection iv) Update a document.	08																				
	b	Differentiate between indexing a document and retrieving a part of document in Elasticsearch.	08																				
8	a	Justify that following schedules are serializable or not. <table><tr><td><math>T_1</math></td><td><math>T_2</math></td></tr><tr><td><math>R(A)</math></td><td></td></tr><tr><td></td><td><math>R(B)</math></td></tr><tr><td><math>W(A)</math></td><td></td></tr><tr><td></td><td><math>W(B)</math></td></tr><tr><td></td><td><i>Commit</i></td></tr><tr><td><math>R(B)</math></td><td></td></tr><tr><td><math>W(B)</math></td><td></td></tr><tr><td></td><td></td></tr><tr><td><i>Commit</i></td><td></td></tr></table>	$T_1$	$T_2$	$R(A)$			$R(B)$	$W(A)$			$W(B)$		<i>Commit</i>	$R(B)$		$W(B)$				<i>Commit</i>		
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b	Compare the following with respect to recovery <ul style="list-style-type: none"> <li>i) No-steal and No-force approach</li> <li>ii) Checkpointing and fuzzy checkpointing</li> </ul>	04																						
C	Justify that, shadow paging is used as recovery method in transaction processing with neat diagram.	08																						
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