

PARUL UNIVERSITY
Faculty of Engineering & Technology
B Tech Examination

Subject Name: DBMS Subject Code: 203105251 Branch/Semester: CSE/IT/4TH
Date: 04/03/2020 Time: 10:30 AM to 12:00 PM Total Marks: 40

Sr.No		Marks
Q.1	<p>(A) Select the correct answer of the following questions from given options</p> <p>1. Which of the following statement is false with respect to integrity constraints (CO:2, PO:2)</p> <p>a. An instructor Id. No. cannot be null, provided Instructor Id No. being primary key</p> <p>b. No two citizens have same Adhar-Id</p> <p>c. Budget of a company must be zero</p> <p>d. None of the above</p> <p>2. Consider a relation R(A, B) where A is primary key and B is foreign key referring to same relation. Which of the following row sequence can be inserted successfully in R (CO:2, PO:4)</p> <p>a. (1, null)(2,1)(2,2)(3,2) b. (null,1)(1,2)(2,3)(3,4)</p> <p>c. (1, null)(2,1)(3,2)(4,2) d. None of the above</p> <p>3. Consider relation S(A,B,C) having the tuples {(1,2,3),(4,2,3),(5,3,3)} Which of the following dependencies does not hold over S (CO:2, PO:4)</p> <p>a. $A \rightarrow B$ b. $BC \rightarrow A$</p> <p>c. $B \rightarrow C$ d. $AC \rightarrow B$</p> <p>4. The attribute name could be structured as an attribute consisting of first name, middle initial, and last name. This type of attribute is called (CO:2, PO:2)</p> <p>a. Simple attribute</p> <p>b. Composite attribute</p> <p>c. Multivalued attribute</p> <p>d. Derived attribute</p> <p>5. Which of following query transformations (replacing L.H.S. expression with R.H.S. expression) are correct? R1 and R2 are relations, C1 and C2 are conditions and A1 and A2 are the attributes of R1 (CO:4, PO:2)</p> <p>a. $\sigma_{C1}(\sigma_{C1}(R1)) \rightarrow \sigma_{C2}(\sigma_{C2}(R1))$</p> <p>b. $\sigma_{C1}(\pi_{A2}(R1)) \rightarrow \pi_{A1}(\sigma_{C2}(R1))$</p> <p>c. $\sigma_{C1}(R1 \cup R2) \rightarrow \sigma_{C1}(R1) \cup \sigma_{C1}(R2)$</p> <p>d. $\pi_{A1}(\sigma_{C1}(R1)) \rightarrow \sigma_{C2}(\pi_{A2}(R1))$</p>	05
	(B) Fill in blanks	05
	1. Drop command is used to delete a table (data and schema) in SQL (CO:3, PO:2)	
	2. Inner type of Join returns all rows that satisfy the join condition (CO:3, PO:2)	
	3. If $D_1, D_2 \dots D_n$ are domains in a relational model, then the relation is a table, which is a subset of $D_1 \times D_2 \times \dots \times D_n$ (CO:2, PO:2)	

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	<p>4. (CO:3, PO:4)</p> <p>A table RESULT in a relational database has the following rows and columns:</p> <table><tr><th>ROLL NO</th><th>MARKS</th></tr><tr><td>22456</td><td>65</td></tr><tr><td>22457</td><td>48</td></tr><tr><td>22458</td><td>58</td></tr><tr><td>22459</td><td>NULL</td></tr></table> <p>The following sequence of SQL statements was successfully executed on above table:</p> <p>Update RESULT set MARKS= MARKS+5;</p> <p>Select avg (MARKS) from RESULT;</p> <p>Then Average marks computed by above query is <u>62</u></p>	ROLL NO	MARKS	22456	65	22457	48	22458	58	22459	NULL																											
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22456	65																																					
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	<p>5. Consider the following tables T1 and T2:</p> <table><tr><th colspan="2">T1</th><th colspan="2">T2</th></tr><tr><th>P</th><th>Q</th><th>R</th><th>S</th></tr><tr><td>2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>3</td><td>8</td><td>8</td><td>3</td></tr><tr><td>7</td><td>3</td><td>3</td><td>2</td></tr><tr><td>5</td><td>8</td><td>9</td><td>7</td></tr><tr><td>6</td><td>9</td><td>5</td><td>7</td></tr><tr><td>8</td><td>5</td><td>7</td><td>2</td></tr><tr><td>9</td><td>8</td><td></td><td></td></tr></table> <p>In table T1, P is the primary key, Q is the foreign key referencing R in table T2 with on-delete cascade and on-update cascade. In table T2, R is the primary key and S is the foreign key referencing P in the table T1 with on-delete set NULL and on-update cascade. In order to delete record (3,8) from table, numbers of additional record that need to be deleted from table T1 is <u>0</u>.(CO:3, PO:4)</p>	T1		T2		P	Q	R	S	2	2	2	2	3	8	8	3	7	3	3	2	5	8	9	7	6	9	5	7	8	5	7	2	9	8			
T1		T2																																				
P	Q	R	S																																			
2	2	2	2																																			
3	8	8	3																																			
7	3	3	2																																			
5	8	9	7																																			
6	9	5	7																																			
8	5	7	2																																			
9	8																																					
Q.2	Attempt any four	12																																				
A	<p>Write the Relational Algebra Expression for given queries on given relations (CO:1, PO:2)</p> <p>User(id, name, age, gender, <u>occupation_id</u>, <u>city_id</u>)</p> <p>Occupation(<u>occupation_id</u>, occupation_name)</p> <p>City(<u>city_id</u>, city_name)</p> <p>1) Display the name of users having age above 25 and below 35</p> <p>$\Pi_{name}(\sigma_{age>25 \wedge age<35}(User))$</p> <p>2) Display name and gender of users working as ‘Software Engineers’</p> <p>$\Pi_{name, gender}(User \bowtie_{occupation_id} (\sigma_{occupation_name='Software$</p>																																					

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	<p>Engineering'(Occupation)))</p> <p>3) Display the name and age of users who are not living in 'Toronto' and 'New York'</p> <p>$\Pi_{name, age} (User \bowtie_{city_id} (\sigma_{city_name \neq 'Toronto' \wedge city_name \neq 'New York'} (City)))$</p>																									
B	<p>Differentiate between primary key and foreign key based on following criteria: (CO:2, PO:4)</p> <p>1) Null values 2) Duplicate values 3) Indexing</p> <table><thead><tr><th>Property</th><th>Primary Key</th><th>Unique Key</th><th>Foreign Key</th></tr></thead><tbody><tr><td>Definition</td><td>PK Definition</td><td>UK Definition</td><td>FK Definition</td></tr><tr><td>Number allowed per table</td><td>No</td><td>Yes</td><td>Yes</td></tr><tr><td>Allows NULL Values</td><td>No</td><td>Yes</td><td>Yes</td></tr><tr><td>Allows Duplicate Values</td><td>No</td><td>No</td><td>Yes</td></tr><tr><td>Indexed</td><td>Yes, Automatically</td><td>Yes, Automatically</td><td>No Index is automatically created</td></tr></tbody></table>	Property	Primary Key	Unique Key	Foreign Key	Definition	PK Definition	UK Definition	FK Definition	Number allowed per table	No	Yes	Yes	Allows NULL Values	No	Yes	Yes	Allows Duplicate Values	No	No	Yes	Indexed	Yes, Automatically	Yes, Automatically	No Index is automatically created	
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C	<p>Compute the canonical cover for given relation R and set of functional dependencies F (CO:2, PO:5)</p> <p>$R = (C, S, J, D, P, Q, V), F = \{C \rightarrow CSJDPQV, JP \rightarrow C, SD \rightarrow P, J \rightarrow S\}$</p> <p>$F^+ = \{C \rightarrow JDQV, JP \rightarrow C, SD \rightarrow P, J \rightarrow S\}$</p>																									
D	<p>What is deletion anomaly? How it affects the integrity of data? Discuss with example? (CO:2, PO:4)</p> <p>Consider a relation emp_dept (E#, Ename, Address, D#, Dname, Dmgr#) with E# as a primary key.</p> <p>Now consider there is only one employee in some department and that employee leaves the organization</p> <p>Then the tuple of that employee has to be deleted from the table, but in addition to that information about the department also will be deleted.</p> <p>This kind of problem in the relation where deletion of some tuples can lead to loss of some other data not intended to be removed is known as delete anomaly.</p> <p>A record of data can legitimately be deleted from a database, and the deletion can result in the deletion of the only instance of other, required data</p>																									

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	<table><tr><th>EmpID</th><th>EmpName</th><th>Address</th><th>DeptID</th><th>DeptName</th><th>DeptMngr</th></tr><tr><td>E1</td><td>Raj</td><td>Rajkot</td><td>D1</td><td>C.E.</td><td>Patel</td></tr><tr><td>E2</td><td>Samir</td><td>Rajkot</td><td>D2</td><td>Civil</td><td>Shah</td></tr><tr><td>E3</td><td>Meet</td><td>Baroda</td><td>D1</td><td>Computer</td><td>Patel</td></tr><tr><td>E4</td><td>Deepak</td><td>Surat</td><td>D1</td><td>C.E</td><td>Patel</td></tr><tr><td>E5</td><td>Suresh</td><td>Surat</td><td>D3</td><td>Electrical</td><td>Joshi</td></tr><tr><td>ⓧ null</td><td>null</td><td>null</td><td>D4</td><td>Chemical</td><td>null</td></tr></table> <div>Delete Anomaly If we delete Employee having ID “E2” then Civil department will also delete because there is only one record of Civil dept.</div> <div>Insert Anomaly Do not allow to insert new Department “Chemical” until an employee is assign to it.</div> <div>Update Anomaly An update anomaly exists when one or more records of duplicated data is updated, but not all.</div>	EmpID	EmpName	Address	DeptID	DeptName	DeptMngr	E1	Raj	Rajkot	D1	C.E.	Patel	E2	Samir	Rajkot	D2	Civil	Shah	E3	Meet	Baroda	D1	Computer	Patel	E4	Deepak	Surat	D1	C.E	Patel	E5	Suresh	Surat	D3	Electrical	Joshi	ⓧ null	null	null	D4	Chemical	null	
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E5	Suresh	Surat	D3	Electrical	Joshi																																							
ⓧ null	null	null	D4	Chemical	null																																							
E	Differentiate between Dense Index and Sparse Index with examples? (CO:3, PO:2) <table><tr><th>Dense Index</th><th colspan="2">Sparse Index</th></tr><tr><td><i>Index size</i></td><td>Larger</td><td>Smaller</td></tr><tr><td><i>Records in data file</i></td><td>Need not be clustered</td><td>Need to be Clustered</td></tr><tr><td><i>Time to locate data</i></td><td>Less</td><td>More</td></tr><tr><td><i>Computing time in RAM</i></td><td>Less</td><td>More</td></tr><tr><td><i>Overhead for insertions and deletions</i></td><td>More</td><td>Less</td></tr><tr><td><i>Data pointers pointing to</i></td><td>Each record in the data file</td><td>Fewer records in the data file</td></tr></table>	Dense Index	Sparse Index		<i>Index size</i>	Larger	Smaller	<i>Records in data file</i>	Need not be clustered	Need to be Clustered	<i>Time to locate data</i>	Less	More	<i>Computing time in RAM</i>	Less	More	<i>Overhead for insertions and deletions</i>	More	Less	<i>Data pointers pointing to</i>	Each record in the data file	Fewer records in the data file																						
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Q.3	Attempt any two	08																																										
A	Consider the relation schema of the relation SCHEDULE shown below. What is the highest normal form of this relation? (CO:2, PO:5) SCHEDULE (Stud_ID, Class, Stud_Name, Stud_Major, Class_Time, Building, Room, Instructor) Assume the following functional dependencies Stud_ID→Stud_Name Stud_ID→Stud_Major Class →Class_Time																																											

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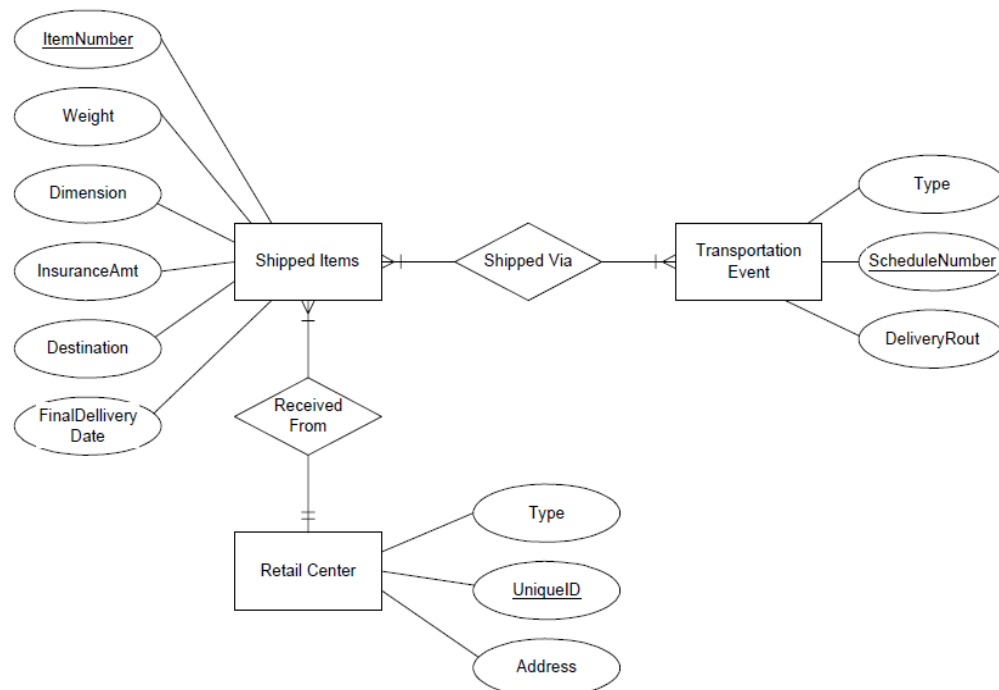
	Class → Building, Room Class → Instructor	
B	<p>Let the following relation schemas be given $r = (A, B, C)$, $s = (D, E, F)$</p> <p>Give an expression in the <i>tuple relational calculus</i> that is equivalent to each of the following relational algebra expressions (<i>CO:1, PO:2</i>)</p> <ol style="list-style-type: none"> $\sigma_{B=17}(r)$ $\{t \mid t \in r \wedge t[B] = 17\}$ $\Pi_{A,F}(\sigma_{C=D}(r \times s))$ $\{t \mid \exists p \in r \exists q \in s (t[A] = p[A] \wedge t[F] = q[F] \wedge p[C] = q[D])\}$ 	
C	<p>You are given a relation $R(A, B, C, D, E, F)$ and functional dependencies $F = \{ABC \rightarrow DEF, AC \rightarrow F, BD \rightarrow A, C \rightarrow DF, EF \rightarrow B\}$ determine if $R1(A, B, C, D, F)$ and $R2(B, C, E)$ is looseless or loosy. Justify your answers (<i>CO:2, PO:2,4</i>)</p> <p>loosy You are given a relation $R(A, B, C)$ with following functional dependencies $F = \{A \rightarrow B, B \rightarrow C, C \rightarrow A\}$ Determine if $R1(AB)$ and $R2(BC)$ are dependency preserving or not. Justify your answer (<i>CO:2, PO:2,4</i>)</p> <p>Dependency Preserving.</p>	
Q.4 (A)	<p>For given table write the SQL for each given query (<i>CO:3, PO:2</i>)</p> <p>Employee (name, street, city) Works (name, company_name, salary) Company (company_name, city)</p> <ol style="list-style-type: none"> Modify database so that Alex now lives in NEW YORK UPDATE Employee SET city='NEW YORK' where name='Alex' Increase the salary of all employee by 20% UPDATE Employee SET salary = salary*1.20 Delete all tuples in employee who works in "ABC Company" DELETE FROM Employee WHERE name IN (SELECT name FROM Employee NATUAL JOIN Works WHERE company_name = 'ABC Company') Display different groups of salary less than 5000 in descending order. Select salary from works where salary <5000 group by salary order by salary desc; Display all company whose city is NEWYORK form company table SELECT company_name FROM Company NATUAL JOIN Works WHERE city = 'NEW YORK' 	05
(B)	<p>A shipping company maintains information on the processing and current location of each shipped item. To do this, it uses a company-wide information</p>	05

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system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, and final delivery date. Shipped items are received into the company's system at a single retail center. Retail centers are characterized by their type, uniqueID, and address. Shipped items make their way to their destination via one or more standard transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a deliveryRoute.

Create an Entity Relationship diagram that captures this information about the system. Mention the key attributes, relations and cardinality constraints (CO:2, PO:1)



OR

- (B)** Suppose you are given the following requirements for a simple database for the National Hockey League (NHL) the NHL has many teams, each team has a name, a city, a coach, a captain, and a set of players, each player belongs to only one team, each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records, a team captain is also a player, a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 1999) and a score (such as 4 to 2). Construct a clean and concise ER diagram for the NHL database. List your assumptions and clearly indicate the cardinality mappings, relations as well as key attributes in your ER diagram (CO:2, PO:1)

05

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